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Original Contributions.

THE PHILOSOPHY OF MASTICATION RELATIVE TO DENTAL PROSTHESIS.

By B. J. Cigrand, M.S., D.D.S., Chicago. Read Before the Illinois State Dental Society, at Rockford, May 14–17, 1901.

The subject of mastication is one in which we as dentists, ought to be profoundly interested, not alone in the genus homo, but in the entire animal kingdom, since a full understanding of the process of eating and philosophy of mastication can come only after a diligent study of comparative anatomy. I will not burden you with the theories which relate to the evolution of the present perfect masticatory apparatus of man, but I cannot refrain from emphasizing the necessity of close observation of the habits and foods of the lower animals.

You will observe that I differentiate between the terms "process of eating" and "philosophy of mastication." Now, I believe that all animals having teeth eat, yet not all animals having teeth masticate. To me the word mastication means the process of cutting, grinding and crushing of food; and this word according to such inference relates most happily to man, since his jaws admit of the functions of cutting, grinding and crushing. The word philosophy in connection with this paper pertains to the architecture, movements and force of the human jaw.

Before proceeding with the scientific results, as I have found them, I wish to call attention to the fact that the paper is intended primarily to prove that the ordinary articulator, which allows simply a ginglymoid movement, does not admit of reproducing nature and consequently causes failures. I am imbued with the idea that artificial dentures as generally constructed are decidedly abortive and do not thoroughly fulfill the purpose for which they are intended, and the time is coming when this old-time ginglymoid articulator will claim the same consideration in prosthetics that the turn-

key holds in oral surgery. It will be a thing of the past and serve simply as a milestone in the evolution of dentistry.

If we hope to advance in our calling we cannot stand idly by and disregard nature. If we wish to make a success of this grand division of dentistry we must follow the example of those skilled in operative dentistry, by modeling after nature. The reason why Drs. Black, Johnson and Pruyn have made such phenomenal strides in the science of tooth preservation is because they have studiously observed the requirements and laws of nature; and ever since they have recognized the function of the contact point, and prepared cavities in accordance with the laws of mechanics, there has been inaugurated an era of dental preservation.

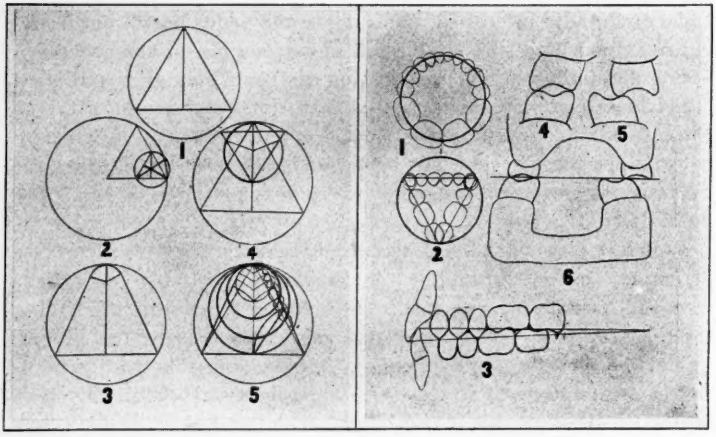


Diagram A.* Diagram B.

We in the prosthetic department can make little headway—can give the patient little comfort—unless we do what the operative men have done, namely, study nature, and when we have mastered this pattern made by the Creator, and have put it on the pedestal as our model, then we shall have reached the divine origin of things. In the past we have been blindly led to think that appearances were the cardinal requisite and that any other demands were subsidiary. It is said that a spirit of discontent is often an indication of progressive impulses, and if this be true, the discontent which now

*NOTE—All the illustrations for this article were drawn and executed by the author.—[ED.]

prevails concerning the ginglymoid articulator must be accepted as indicating progress.

To Dr. Bonwill we are all indebted for much knowledge on the subject of articulation and occlusion; and I am proud that I received, some years ago, personal instruction from Dr. Bonwill regarding his methods and system of arranging artificial teeth. Though I do not now agree with him in most particulars, I nevertheless revere him for having been the cause of stimulating and directing my studies on this theme. I cheerfully quote what Dr. E. J. Perry has said—"I feel the profession owes Dr. Bonwill an unpaid bill; a debt of gratitude. While his methods and conclusions may be revised, he certainly is entitled to the fullest credit for his inventions and discoveries. Morse made the first telegraph; Howe the first sewing-machine. Their work has been revised, added to and substracted from until the original inventions and discoveries are not now recognizable as theirs, yet who denies them the glory or withholds from them the credit?" With this I conclude the proem of my paper and briefly call attention to the drawings.

Diagrams A and B. These two are accurate copies of Dr. Bonwill's drawings, and I have reproduced them so we might employ same as references.

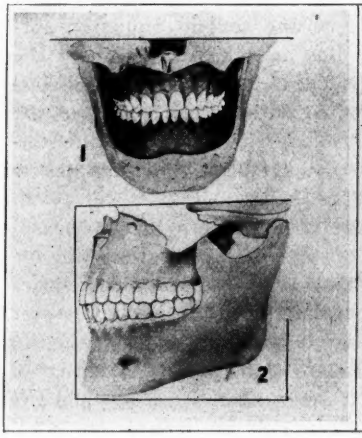


Diagram C.

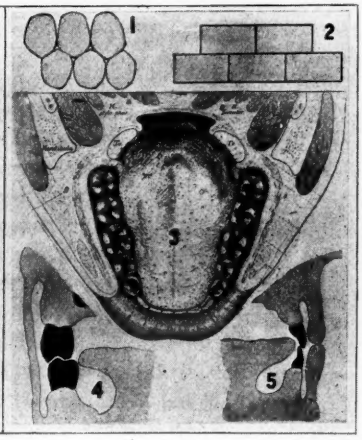


Diagram D.

Diagram C. This diagram and its two figures I drew in the hope that they might help in the discussion and facilitate comprehending the discourse. It is a true copy of the jaws and can serve us in demonstrating the plans of nature in her disposition of the dental organs.

Diagram D. The individual tooth, as nature supplies it, is free from immediate support; the neighboring teeth approximate but are in no sense attached. They lend one another strength in that they are positioned in a geometric figure, having the elements of a triangle, circle and square; and this allows that the contact point of each tooth shall touch its neighbor. The teeth are so arranged in this figure that a strain which falls on any one of them of either half of the superior or inferior dental arch, is communicated to the several teeth on that side of the jaw, thus distributing the strain. Hence each tooth is as independent of its neighbor in its functional character as though the masticating apparatus consisted of but a single superior and two inferior teeth, or vice versa, as Fig. 1 shows. This disposition of the teeth is well illustrated in architecture in the building of brick walls, and is known as "bricking the joints." Fig. 2. In the mouth this arrangement serves the dual purpose of permanently establishing the position of each tooth and assisting most decidedly in breaking food of a brittle character. Fig. 3 represents clearly the inferior half of the mouth, known as the lingual cavity, showing how the tongue hugs the surfaces of the teeth and how the lips and cheeks fold about the opposite surfaces. A wise arrangement in nature admits that mastication can be vigorously prosecuted without molestation of the tongue or cheeks. This happy result is attained in that the inferior teeth extend to the center of the dental figure, while the superior teeth extend to the circumference, as shown in Figs. 4 and 5. In conjunction with this idea, I believe artificial teeth should be fashioned as in Figs. 4 and 5. The teeth should be ground to yield occlusal surfaces and so shaped that the superior accurately complement the inferior teeth. If constructed as diagramed they will glide over each other more readily, facilitating mastication and assisting in retaining the dental bases. I cannot agree with the theory of Dr. Bonwill in his dental forms, as indicated in Figs. 4, 5 and 6 of Diagram B. He has the lingual cusps of the inferior teeth too high, and they pitch too decidedly outward above and inward

below. Such a condition will tend to dislodge the superior base. But when the teeth are as Diagram D, Figs. 4 and 5, they allow the tongue to direct and deliver the food on the lingual cusps of the inferior teeth, while the cheeks coax the food up against the buccal cusps of the superior ones. And in this battle of forces between the tongue and cheeks mastication is normally accomplished.

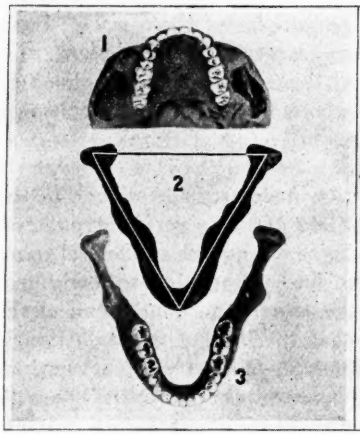


Diagram E.

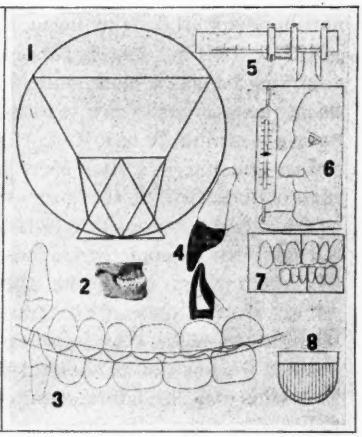


Diagram F.

Diagram E. This accurately represents the figure which the teeth form in both the superior and inferior maxillary bones. I labored diligently to portray the two jaws in harmony with nature, and have brought innumerable models, casts and skulls to aid in demonstrating that the drawings are perfect. These outlines have been passed upon by three anatomists whom the profession freely recognizes as specialists in this department of medicine. They pronounce the pictures true copies of the jaws. Upon this diagram I base my theorem of trigonometry, relative to the disposition of the teeth in prosthodontia, and of which I will speak later. Fig. 1 indicates the superior maxillary bone and Fig. 3 the inferior, while Fig. 2 gives us a shadow or silhouette view. The triangularity of the lower jaw immediately appeals to us; hence if a line is drawn from the center of the right condyle to the same point on the left, and then two lines from these points that will meet at the septum of the

inferior incisors, there will have been described a perfect equilateral triangle. Fig. 2. The length of these lines will be somewhat more than four inches. You will observe that the human jaws are not so pointed as indicated by both the drawings and theorems of Dr. Bonwill. They are not so short and sharp as he represented them in Diagram A, Fig. 5. And if he portrayed the shapes of the jaws contrary to nature, he also applied the wrong theorem and could not hope to attain the normal philosophy of these jaws. I am satisfied that he was in error in his geometric deductions, and although he was a close student of this subject, I fear he failed to select the composite jaw, and in consequence did not complement the right geometric figure.

Diagram F. In this I have designed the theorem which meets the requirements of the proposition under consideration. In the first place, we use a circle to facilitate getting a perfect equilateral triangle; since geometry teaches us that a perfect equilateral triangle is produced by joining three lines of equal length within a circle. I next observed that in the anterior portion or half of the triangle the teeth were located; that the base of this sub-triangle marked the position of the molar teeth. Geometry teaches further, that when two equilateral triangles are brought in apposition with their cones they form the outer surfaces of a square, the center of which describes the arc of a circle. Where the circle meets with the straight line is registered the first inferior bicuspid. It has been taught in the past that the cuspids were the prominent teeth which marked the point where the circle verged into a line, and consequently we have been at loss to ascertain the geometric figure and proposition. This would answer our purpose. The first bicuspids in the inferior maxilla are the guiding points and their importance must not be underestimated, as I will shortly demonstrate. The solution of this problem did not occur to me until I had given the subject something like five years of study, and many a diagram I drew before I acquainted myself with this underlying principle. I have discussed this theorem and proposition with several professors in the University of Chicago, and have interested them sufficiently in the subject of dentistry to go into the matter with me, and they have given the seal of approval to this deduction. When you compare Fig. 1 with Fig. 3 of Diagram E you will readily observe the correctness of the proposition. Dr. Bonwill was work-

ing along the right lines, but accepted the wrong theorem, and consequently his jaw is too pointed and does not fulfill the requirements of nature. You will notice that this vexed query is simplified by my figure in that we dispense with the innumerable lines, circles and fractional circumferences found in Dr. Bonwill's theorem, Diagram A, Figs. 1, 2, 3, 4 and 5. The question is not one of circles but of triangles, and the next few figures and diagrams will prove that triangles are the fundamentals.

Before leaving this diagram you will notice that my figures have the teeth towards the observer, Dr. Bonwill's having the teeth from him. I placed them so because we are taught in dentistry and anatomy to study the human mouth from the median line. Instead of viewing the jaws from the distal surface—through the patient's throat, we are looking at our subject as you would observe him in the chair. Fig. 2 gives a clear idea of the curve which is found when viewing the jaws from the lateral aspect. Dr. Bonwill taught us that the length of the cusps is in proportion to the depth of the overbite, and that the cusps diminish in length as we go distally. This was indeed a great discovery and I need not dwell on the importance of understanding the purpose of this curve and the necessity of knowing the value of Dr. Bonwill's deductions in their relation, for all present must be familiar with this, the crowning glory of that great man's life. I might add that he represents this overbite as a triangle, Diagram B, Fig. 3, and I have drawn it to approximate nature and represent it as two curves approaching each other distally.

Fig. 3. The lower jaw during the process of mastication forms somewhat of a triangle while opening and closing, as Fig. 4 indicates. When the jaw is opened it falls backward and downward, and in closing it moves slightly forward and then upward, describing the outlines of the figure represented in Fig. 4. Now, if the anterior tooth goes through this movement and describes such a figure all the inferior teeth being a stable part of the jaw must necessarily form a like figure. To determine what relation this movement has to the shape and movements of the jaw and condyles, I have had manufactured the instruments you see in Figs. 5, 6, 7 and 8, and by their use I have arrived at many interesting conclusions.

Diagram G, Fig. 1, represents what I have chosen to call a lateral

triangle, which is formed by a line from the condyle forward to the front teeth, then back over the plane of occlusion and thence up to the center of the condyle (and the lowest point, is the pivotal point of the jaws). When this imaginary triangle is coupled with

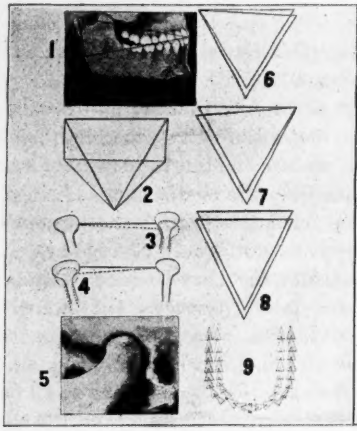


Diagram G.

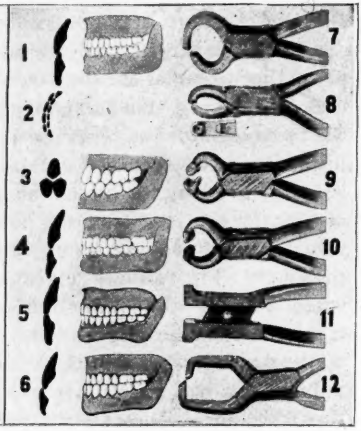


Diagram H.

the anterior triangle they describe Fig. 2. Another set of triangles is formed while the jaw is in process of mastication. When the lower jaw rotates to the left the right condyle moves forward and downward, while the left one simply turns on its axis. The reverse is true when the jaw is thrown in the opposite direction, and in consequence *imaginary triangles are formed corresponding to the depth of the glenoid fossa and the length of the cusps of the teeth.* Figs. 3, 4. This assists in determining the overbite. When the jaw cannot be freely rotated it indicates a predisposition on the part of the patient to live the life of carnivora, meat-eating; while when the jaw can be readily thrown from right to left there is a disposition in the owner to be herbivorous, grain and vegetable-eating. In the former I observe that the glenoid cavity is *deep* and in the latter *shallow*. Fig. 5 illustrates the condyle *in situ*, the glenoid cavity being clearly portrayed. The condyle moves forward and downward until obstructed in its further tendency by the eminentia articularis, and when the condyle moves beyond this

point there is dislocation. Fig. 6 shows the inferior jaw thrown to the right, Fig. 7, moved to the left, and Fig. 8, thrown forward. The triangle being pinioned at either right or left side, and being a perfect unit, all points must swing in the arc of the circle in proportion as they are distant from the pinion center. If this be true—and I see no error in it—then the cusps in *normal* mastication must all describe small triangles, as Fig. 9 illustrates. Hence, everything seems to indicate that the philosophy of mastication is founded on triangles and not on circles. When we more thoroughly understand these principles we can produce prosthetic substitutes capable of rendering service. If we continue to construct our dentures in defiance of these underlying truths, we are not only yielding abortive results, but are disgracing the divinity which enters into the work of our noble calling.

Diagram H. I here outline what I think indicates the various mechanical forces which the jaw can employ, and it may seem to many that my deductions do not agree with the beliefs of the past, in that we have been taught that the jaw possesses simply shear movement. The jaw being pinioned an inch to an inch and a half above the plane of occlusion, such a movement is impossible. Figs. 1 and 7 represent the mechanical force of the front teeth in normal mouths. Figs. 2 and 8 show how the jaws meet simultaneously in cutting. Figs. 3 and 9 demonstrate the force, as applied at the juncture of the superior bicuspid. Figs. 4 and 10 illustrate the force when the front teeth meet directly on the incisal edge. Figs. 5 and 11 indicate the open and shut movements, as in the parallel-pliers. Figs. 6 and 12 show the mechanical apparatus in cases where there is protrusion of the inferior jaw.

Diagram I. There is not to-day an articulator in the market which accurately copies the movements of the jaw. Although the Bonwill and Gritman approximate the motion, they fail to register it accurately at the most important points. In the preceding pages I have given you the anatomical outlines and principles of the jaws, and after years of consideration have constructed an articulator which I believe is an improvement over those now used. It is briefly this: It copies the jaw in its downward, forward and upward movements; and its lateral movements as well, which is the prime consideration. I have also constructed an articulator for crown and bridgework which works on the principle of a ball and

socket. We all recognize that in cases of dual bridges, as indicated in Diagram J, Fig. 1, with the ordinary open-and-shut articulator we often produce a splendid case, yet when we attach it in the mouth it requires considerable changing—necessitating the grinding off of porcelain facings and gold cusps, whereas, if we possess an articulator which mimics the jaw, the cases can all be carefully adjusted before attaching them.

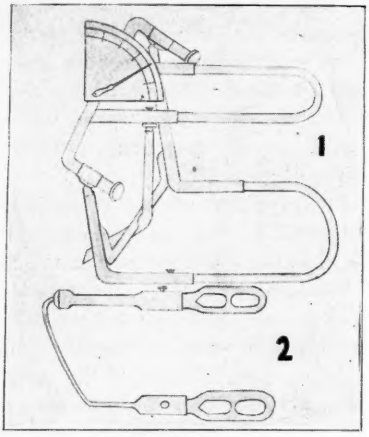
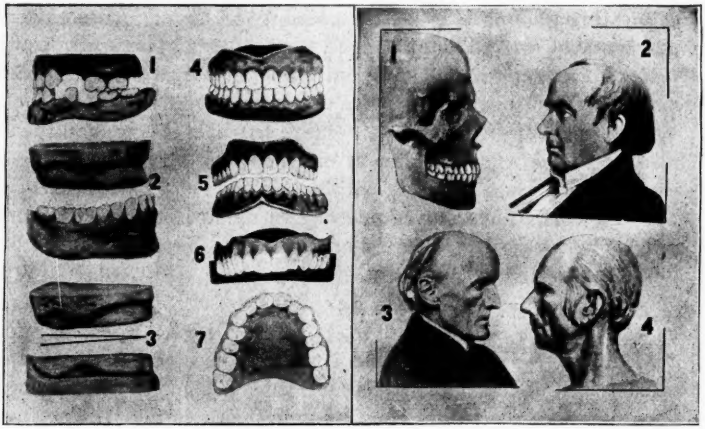


Diagram I.

Diagram J. I here present the variety of problems which confront us on the subject of the position of the artificial substitutes. Fig. 1 indicates how imperative it is to be prepared to have our dual bridges constructed to receive the variety of forces of the jaw. Fig. 2 portrays the making of an upper denture when the lower teeth are still in position, thus indicating the curve of occlusion. But Fig. 3 illustrates the difficulty in determining the exact position of this curve. We are at a loss as to whether it shall take an upward or downward tendency, yet on this particular operation depends largely the practicability of the case. I have not been able to solve the problem, though I am of the opinion that the curve should in most cases take an upward tendency, but this would be more easily determined by a careful study of temperaments. Fig. 4 shows how the artificial teeth should be ground, giving a rather pointed and ridge-like tusk. This I contend must be done for two

reasons; first, it admits of natural relation of the jaws, and second, the cusps must be so formed as to readily incise, tear and grind the food, since the artificial denture is less stable than the natural one, and the teeth must cut the food with less strain.



I would now impress upon you the necessity of anchoring the lower set of teeth at the first bicuspid, as in the Diagram F, Fig. 1, where the circle joins and verges into a line, and marks the position of the first bicuspid. In setting up a full set of teeth the superiors are arranged first; then the inferior ones, but we have been in error in locating the inferior incisors first. The proper manner of occluding and articulating the lower teeth is to first locate the first inferior bicuspid, as it is the prime factor in determining the stability of the lower case. All the teeth must be ground and fitted to afford perfect occlusion and articulation according to this outpost. The superior and inferior teeth should be pitched toward the lingual cavity, since by this position they resist the tipping tendency of dentures, as is shown in Figs. 6 and 7. Dr. Bonwill, I am certain, overlooked this principle when he diagramed Figs. 4, 5 and 6, of Diagram B.

In conclusion, let me say that we must grind and carve our artificial teeth to meet the requirements of nature, since the dental depots pay little or no attention to harmonizing or adapting full

sets of teeth, other than in general outline and shade. The occlusal surfaces should be ground, as the roughened surfaces assist materially the force of mastication. Artificial teeth in the future will in many particulars be different from what they now are, in shape, shade and manner of attachment, and the dentist who assists in educating the public to see the necessity of having artificial dentures moulded, carved and arranged so as to be in harmony with the Creator's conception, will not only assist in raising this grand department from out of the hands of empirics, but will add laurels to the profession which fosters his existence. The ability to choose teeth and change them to suit the great law of correspondence is an art confined well within the precincts of the science. None here will argue that the selection of artificial teeth should not be in conformity with Nature's orders, so we must be guided by what are resolutions in her book.

The artificial dentures which I exhibit to this society were constructed from six sets of teeth made by the Dental Protective Supply Company. From these several sets I selected such sizes as approached nature and then ground and shaped them so they would admit of lateral movement, thus mimicing nature.*

Diagram K. This I designed to show the three classes of faces. Fig. 1, the normal skull; Fig. 2, the straight face, represented by Daniel Webster; Fig. 3, the concave face, showing Cardinal Newman, and Fig. 4, the convex face, portraying Henry Clay. These variations and the temperament of the patient must be recognized, when such patient is edentulous.

Diagram L. This represents the motive temperament, as indicated by Susan B. Anthony, and her constitutional outlines show us that her teeth are well developed and have clearly defined cusps, consequently also a well-rounded curved occlusal plane, as Figs. 2, 3 and 4 illustrate. The articulator must be so arranged as to allow for the compensating curve.

Diagram M. This illustrates the opposite kind of face and is of the lymphatic temperament. The teeth show that the jaw freely rotates. The cusps are illy defined, the glenoid cavities shallow, and there is no compensating curve. The face illustrates that of

*NOTE—Among the dentists who prepared artificial dentures to exhibit in connection with this paper, I am pleased to mention Drs. E. J. Perry, T. W. Pritchett, and G. M. Brunson. Besides S. S. White Dental Mfg. Co., Consolidated Dental Mfg. Co. and H. D. Justi & Son sent many cases to demonstrate methods of artificial articulation and occlusion.

Elizabeth Cady Stanton. In such cases as hers the denture must be constructed to bear out the normal conditions of rotation.

In the past many men of our profession have labored with the same problem I to-day present, and among those who have contributed much valuable material I gladly mention Drs. Walker, Snow, Black and Bonwill. The latter has given the greatest consideration and his work has prompted others to further investigation. I desire to pay this compliment to our departed friend, as I regard him as having been the greatest genius who has devoted his life to prostho-

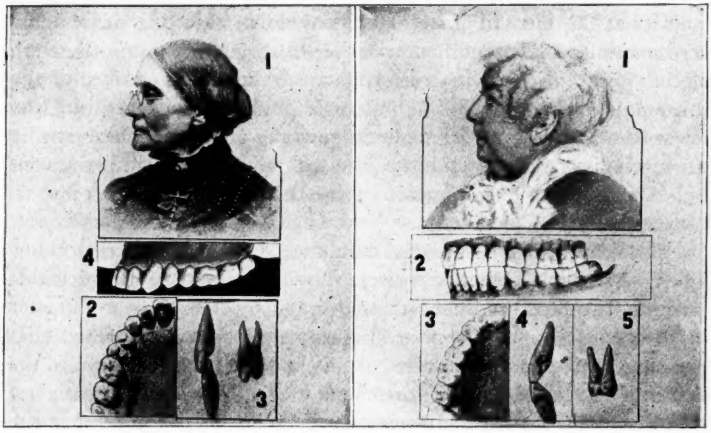


Diagram L. Diagram M.

dontia. If I have added anything of value to those who have labored in this same field and have awakened others on the same theme, I shall consider it sufficient compensation for my efforts, and in the firm belief that I have conscientiously sought to make the subject clear and dutifully aimed to render an unbiased deduction, I can with patience await the judgment of this gathering.

Discussion. *Dr. E. J. Perry*, Chicago: This is the most remarkable paper upon the subject of dental prosthesis that has ever been given to the profession, and Dr. Cigrand deserves the gratitude of every man present. I am inclined to believe that the trigonometrical and not the geometrical theory is correct, and that Dr. Cigrand is right when he states that it is a matter of triangles and

not of circles. Dr. Bonwill found after examining some thousand jaws that measuring from a point on one condyle to the other, and from either of these points to the cutting edge of the lower incisors at the median line, described a perfect triangle. About this he constructed all his theories and attempted to prove by geometry the position of every tooth. He made this diagram, No. 5, and tried to determine the position of the teeth by this series of circles. Here he should have dropped his geometry and taken up his trigonometry. There are two triangles half way from this point to this one (indicating.) This point represents the cutting edge of the lower incisors at the median line. Half way down this line draw a line across and you have another triangle, in which are found the teeth of the lower jaw. A line drawn across the distal surface of the third molar will make this sub-triangle, and in it will be found the lower teeth. Dr. Bonwill made the mistake of getting the teeth by the circle too far back and the jaw too pointed. Here is the condyle and here the distal surface of the third molar, almost up to it; consequently the figure must be wrong, but Dr. Bonwill was not. He discovered that the greatest diameter of the fourteen teeth below when added together made a circle in which would be included this triangle, the distance of which was made by the greatest diameter of the same teeth arranged in this way. He also discovered that the length of the cusps on the cuspids and bicuspids determined the depth of the overbite. He attempted to illustrate that here, but could not have made his drawing correctly, as he did not put in the compensating curve. We add to this that the depth of overbite and the length of cusps also determine the depth of the compensating curve. The condyle and glenoid fossa, as emphasized by Dr. Cigrand, also sustain an intimate relation to the length of cusps and to the depth of overbite and compensating curve.

It was very kind of the S. S. White Co. to send these things here, but they don't amount to anything. Some one in the East arranged these teeth presumably upon the lines laid down by nature. This cast was set up by Dr. Essig. You see he has not comprehended the matter at all, because he has a deep compensating curve and no cusps, and you should not have the former without the latter. The plain line articulator is misnamed, as it is merely an occluder. A patient could bite only up and down with a set of teeth arranged on it. The time has come when it is a dis-

grace to have a plain line articulator in the laboratory. Here is a model upon which the teeth are arranged correctly. They were set up by a man who was in Dr. Bonwill's laboratory for two years, and from him I have learned more about the subject than I ever knew before. Dr. Bonwill taught that the teeth should be so articulated that those of the lower jaw might move around over those of the upper in various positions, which have been aptly illustrated by the mortar and pestle. Remember the motions that the chemist makes when he rubs the pestle over the surface of the mortar and you will see what Dr. Bonwill meant to accomplish when he articulated a set of teeth.

I believe the occluding bite is of prime importance, yet some men put into the mouth a large chunk of wax and say "Bite," and there is the bite. An occluding bite should be taken with great care, and should be made of a base plate which the patient can draw up to the mouth tightly. If the bite is made on a base plate of wax which does not fit the model and mouth, the patient will try to retain the plate in position and not bite naturally.

Dr. J. H. Prothero, Chicago: The point that appeals to me most strongly in the study of the movements of the lower jaw is that the natural teeth, when present and normally placed, touch on either side as well as on the anterior part of the mouth in the lateral movements of the jaw. It is possible to so arrange artificial teeth on an anatomical occluding frame that these points of contact can also be secured, and dentures thus constructed will not be so liable to tip under the stress of closure of the jaw as are those constructed without considering this movement, or in cases where the plain line articulator is used. When teeth are occluded on the ordinary articulator it will frequently be found that although they may touch perfectly in full occlusion, yet when fitted in the mouth perhaps only two cusps of the entire set may come in contact during the lateral movements of the jaw. This means that the plates will in almost all cases become displaced unless the patient learns to masticate by simply opening and shutting the jaws like a hinge.

The plain line articulator should have no place in the laboratory, because it follows only one movement of the lower jaw—opening and closing, as in full occlusion, and that very imperfectly. An occluding frame that will enable the prosthetist to try the teeth in the positions they will occupy in the mouth when the lower jaw is

thrown from one side to the other, should be used in all cases. The term "occluding frame" is better than "articulator," because it more clearly expresses the meaning. The teeth when in contact, the lower jaw being normally closed, are in occlusion. The term "partial occlusion" fully explains the relation of the teeth of one jaw to those of the opposite when the lower jaw is projected forward on one or both sides, some of the teeth of either jaw being in contact. By using these terms, "full" and "partial occlusion," the word "articulation" can be eliminated, which would be very desirable.

In mounting models on the occluding frame care should be taken to place them in exactly the same relation to the centers around which they will swing as the natural planes of the jaw sustain to the condyles. The teeth may be so arranged as to strike correctly in full and partial occlusion on frame, yet when fitted in the mouth their position will be found incorrect for partial occlusion if the models do not bear the above relation.

In masticating food the work can be done only on one side of the mouth at one time, or on that side where the condyle remains in its fossa, the relation of the teeth on the opposite side not being favorable to the retention of food between the cusps of the upper and lower teeth on that side. When the side that has been projected forward remains stationary and the opposite condyle is thrown forward, the conditions are reversed and this becomes the working side.

Experiments at Harvard University in 1889 demonstrated that when the lower jaw was projected forward on one side there was in most cases a corresponding recession of the opposite condyle, not prominent, but usually enough so to show that the center of motion was not around the center of the condyle head. Some time later Dr. W. E. Walker, being unaware of these experiments, discovered and demonstrated conclusively the same fact by means of an ingenious apparatus which he devised. He also proved that the jaw when projected forward did not as a rule move in a horizontal plane, but dropped downward at a greater or less angle, depending upon the prominence of the eminentia articularis, and that the center of motion in opening and closing the jaws was not in the head of the condyle, but about fifteen millimeters below it.

These centers of rotation are variable in different individuals, and

those on one side of the jaw sometimes differ from those on the opposite side in the same mouth. Now if artificial dentures are to be constructed so as to render the patient the best possible service, these various movements must be registered and recorded. An occluding frame must be constructed so that these four centers of rotation may be fixed according to each individual case as recorded. There is at present no way of recording these movements, nor is there a frame as indicated. Until these devices are constructed we cannot hope for scientific and satisfactory results.

Dr. A. O. Hunt, Chicago: Prosthodontia means the restoration of teeth; prosthesis means the restoration of a part, so I believe the subject under discussion should be called by the latter term. There is no law in mechanics nor in geometry nor in trigonometry that will regulate or arrange a set of teeth. The one great law which exists in nature to-day is that of variation, and it is the law in the human mouth. No two people have the same arrangement of the teeth, nor do any two masticate alike, consequently the teeth cannot be arranged mathematically. What do we know about the articulation of the teeth in an edentulous mouth? Only those who have made models of natural teeth in position can know the varying conditions in the type, temperament, overbite, manner of mastication, etc.

I wish to pay great tribute to Dr. Bonwill, for he brought before the profession the importance of the study of dental prosthesis. I do not, however, agree with his triangles, for within them you can do anything you please and it proves nothing. He said the distance between the center of the condyle and the mesio-occlusal margin of the central incisor was about four inches. It ranges between four and four and a half inches and there is no certainty about it from a mathematical standpoint, all of which again proves the law of variation.

Dr. Cigrand tells us not to consider the lower teeth, but I cannot agree, as the first ones that appear are the lower central incisors; they are the foundation of the arrangement of the teeth, and are always exactly the length of the lower lip.

How are we going to arrange teeth for a person of nervous or of bilious temperament, where they are interlocked in such a way that there is no lateral movement at all? In one respect the nervous type represents the triangles, but the lymphatic does not at all, it is

a flat jaw. The teeth in a bilious temperament are also flat from cuspid to cuspid. There is an absolute definite relation of the teeth to the lips and face of every person, and we must study the conditions of the mouth as presented by individuals who have normal teeth and normal occlusions. Mechanics plays a very small part in prosthetic dentistry—it is art anatomy, pure and simple.

Dr. T. W. Pritchett, Whitehall: If I grasp Dr. Bonwill's theory correctly, it treats essentially of the occluding surfaces of the teeth. Now, how much do we know concerning the performance of the plates that we put in people's mouths? Dr. Black has stated that it takes fifty pounds of force to masticate tender steak, eighty pounds for tough ditto. He further showed that the force which could be sustained by artificial dentures averaged about thirty pounds. Now if we take the measure of mastication with beefsteak as a standard we have something to work upon. I will venture to say that not one dentist in a thousand ever asks a patient to chew steak and show him the result, yet we must do just this before we can ascertain whether or not it is possible to construct full dentures with which people can properly masticate meat and other foods.

Dr. Hart J. Goslee, Chicago: I am not ready to accept the term prosthodontia, because it is not comprehensive enough, as Dr. Hunt has explained. It was stated in the paper that the dental supply houses would not give us what we wanted. I am quite sure that they are ready to do so just so soon as we ourselves know exactly what we need, and this knowledge will never come until we get at the matter from the foundation and reach some uniformity of opinion.

The term occlusion should be used when the teeth are in absolute contact and normal repose, while articulation means the act of bringing them into occlusion. I would criticise Dr. Prothero's calling an articulator an "occluding frame," for we have enough names and terms already and "articulator" answers the purpose, because when using it we are not only occluding the teeth but articulating them as well.

Dr. G. V. Black, Chicago: It is very important that we understand thoroughly the motions of the lower jaw, and they are what must be studied if we expect to occlude teeth as it should be done. Let us look at the method of forming the occlusion of the natural teeth. We find that, perfect or imperfect, it is formed by the

motions of the lower jaw. As the teeth come into their positions they are guided into place by pressure brought by the lower jaw. During the coming of the permanent teeth we find that the bones of the jaw change their positions, the ramus lengthening as the teeth take their places. As the latter are brought together by closure of the jaws they are guided into their positions by the pressure that is exerted. If a cusp misses a little it is guided into position by a lateral pressure, and we finally find an occlusion that while not perfect is very effective in mastication. In the occlusion of artificial teeth if we make out the motions of the lower jaw perfectly and the pressure that is being exerted, we can then form our occlusion so that cusp will occlude with sulcus as may be necessary to give a perfect result. I do not think that the motions of the lower jaw have as yet been made out, nor that the geometrical lines which have been drawn are thus far perfectly adapted.

In occluding artificial teeth my habit for years has been to do so in the mouth, as I cannot do the work perfectly on an occluding frame. There is one motion of the jaw which has been almost overlooked, namely, that which shows it is not a strictly hinge motion. The hinge is not here at the glenoid fossa, for immediately the mouth begins to open the bearing moves forward and rotation begins first upon that point; then it slides down along the ramus of the jaw until it finally stops at this angle, and there will be the point around which the motion occurs. I had a case recently where there was a motion of fully three-quarters of an inch in the glenoid fossa. These exceptions must be studied as well as the general rules before satisfactory work can be accomplished.

Dr. Pritchett asks which is the predominating force in mastication—cutting, grinding or crushing—and I would reply grinding.

Dr. C. R. Taylor, Streator: No two human jaws are exactly alike, so I do not believe that the teeth can be arranged on an exact mathematical basis. After reading Dr. Bonwill's articles I purchased a very fine human jaw, as near perfect as possible, and the measurement of it showed that the doctor was one-eighth of an inch out of the way, which of course would never do.

One of our difficulties comes from the fact that we use soft material for the trial plate. I recently made an upper case of gold and a lower of Watt's metal, and in trying the cases in the mouth to get the bite I used the aforesaid metals as trial plates. The teeth

were set up on an ordinary articulator, yet after being put in the mouth they did not have to be touched, fitting perfectly. Now if the trial plates had been made of something that would sag when the bite was taken, the teeth probably would not have come within an eighth of an inch of proper occlusion, even if they had been set up on a Bonwill articulator.

As regards this curvature or compensating curve which has been discussed, I saw a man at dinner to-day who could easily dislocate his jaw. The explanation lay in the fact that he had a very shallow glenoid fossa, yet had also a very long bite, his overbite being remarkable. Here you have two conditions in one mouth which are just the opposite of what has been stated as a scientific and mathematical fact. Furthermore, if some of these variations are worked out according to the rules laid down you would have, instead of cusps and sulci, just the opposite. I believe the jaws of the primitive man were prognathic, and according to the rules laid down he could not have had any cusps on his teeth, or if he did they would have been just the opposite from what they are now found to be.

Dr. J. N. McDowell, Chicago: It seems to me that one particular phase of this subject—the form of the teeth—has not been touched upon. The prolific medium through which the teeth are sustained in their positions is carried out through the forms of the cusps, and a special shape is originated under environment or food-habit to perform the proper mastication of food substances. Fishes have long, sharp, slender teeth, used only for mangling food. This shape changes in reptiles, again in insects, more so in carniverous animals, and when we reach the herbivorous class the teeth are broad, square and devoid of cusps. The teeth of man have a shape midway between the two extremes, which is necessary for the mixed diet, upon which he lives. Some of the specimens of articulated teeth shown here to-day have the cusps ground off and an almost flat polished surface left for mastication, which is a direct violation of the law of nature. If every dentist would make a thorough study of the form and function of teeth from a comparative standpoint we should all be of the same opinion regarding proper articulation.

Dr. Cigrand, closing discussion: I have little to say except to thank the members of this society for the high compliment they

have paid my paper in giving so much time to its discussion, and I feel more than compensated for my labors. I welcome just criticism and wish to thank those who have offered same, but in one or two instances I seem to have been misquoted. Perhaps all did not hear my paper plainly or see the diagrams clearly, but to quote me as saying that the inferior jaw plays no important part in connection with this subject, and that the lower teeth are practically subsidiary to the uppers, is absolutely at variance with what I stated. It is gratifying to have so intelligent a discussion and to know that so many are interested in this most important subject.

ANTISEPTIC, GERMICIDE AND DISINFECTANT.

By A. H. Peck, D.D.S., Chicago. Read Before the Illinois State Dental Society, at Rockford, May 14-17, 1901.

The object of this paper is to consider briefly the use in our literature, conversation, etc., of the terms *antiseptic*, *germicide* and *disinfectant*, and the meanings to be attached to these expressions and others that are naturally associated with them, such as *septic*, *infectious*, *deodorant*, etc.

It was my original intention to consider these subjects from the standpoint of drugs, classifying them under the separate divisions, subdividing the general divisions according to the manner in which results are produced, and following with a general consideration of them in their special application. But the more I studied the subject, the more thoroughly impressed I became that the use without distinction of these important terms, as practiced by various authors, was wrong, and also of the inconsistency of the meanings usually ascribed to some of these words. I have for some time been mindful of the desirability of a definite outline as to the meaning to be given to these various terms, and of their application in our literature. I have therefore decided to consider this subject as outlined above, my desire being that it shall receive a full discussion, both pro and con; so that if the application of these terms, according to the outline I shall present, is deemed inexpedient, a statement of that fact can be made; that if my outline is considered faulty, suggestions may be offered; and if the plan is considered feasible, that an expression be had that it is the sense of the Society that some outline like this should be adopted. That is, an outline more definite, more nearly in accord with the original meanings of

the terms themselves, and more consistent with the various pathological conditions to which they are applied.

These terms are for the most part used synonymously. Our medical dictionaries make little or no difference in the meaning of the words antiseptic, germicide and disinfectant. The definitions given for these expressions are almost identical. Many of our leading pathologists and teachers use these words interchangeably as meaning one and the same thing. For instance, Dr. Senn, in using the expression *septic condition* or *septic matter*, seems to mean exactly the same as when he uses the expression *infectious condition* or *infectious matter*. And the words *antiseptic* and *germicide* are used by him as having like meaning. I might mention others of like prominence who use these expressions in a similar way, but it is unnecessary.

Because of the varied conditions, especially of the processes of *infection* and *decomposition*, I believe a sharp difference in meaning should be attached to these terms. From a careful study of the root-meaning of these words one will also find gratifying support of his belief that they should be used as having different meanings. For example: "*Antiseptic*, of Gr. origin, a. and n., meaning *against* and *putrefaction:* As an a. pertaining to *antisepsis*, inimical to the growth and activity of the microorganisms of disease, putrefaction or fermentation. As a n., anything which *destroys* the microorganisms of disease, putrefaction or fermentation, or which restricts their growth and multiplication." (Century Dictionary, Cyclopedia.) This is the only place in which this authority even hints at the thought of destruction in connection with antisepsis, and from what follows I believe this must have been a misprint. "*Antisepsis:* n., Gr. (against and putrefaction.) The more or less complete *exclusion* of living microorganisms from those bodies or substances in which they produce disease, putrefaction or fermentation. (Such organisms may be *destroyed*, as by heat or *germicides*, or excluded, as by coverings or cleanliness, or their activity and multiplication may be restricted, as by the application of *antiseptic* substances or of cold.") (C. D. and C.) In referring to destruction here the term *germicides* is used. Thus, in connection with *antisepsis*, the thought of destruction is not brought up, only that of prevention or exclusion.

"Germicide (n.) is of Latin origin—germ (an), a germ, and cida,

a killer (caedere, kill). That which destroys germs; specifically, a substance capable of killing germs, microbes or microorganisms of certain zymotic diseases, as cholera, or used for that purpose. *Germicidal* (a.) pertaining to or of the nature of a germicide; germ-killing, as germicidal gases." (C. D. and C.) Thus the thought of prevention is not here mentioned. The whole thought of the root-meaning of the word is to kill--*to destroy*. Why should we not retain now this distinct difference in the meaning of these words and make our application of them accordingly?

Gould, author of one of our leading medical dictionaries, says: "*Antisepsis*, exclusion of the germs that cause putrefaction; the totality of measures taken to prevent septic poisoning." "*Antiseptic:* 1. Having power to prevent or destroy putrefaction, or, what is the same thing, the bacteria upon which putrefaction depends. 2. A remedy or agent that prevents a septic process." To my mind the first part of this definition is faulty in that it practically places the thought of prevention on the same plane as that of destruction. In defining the term *germicide*, Gould acquits with credit. He says. "Germicide (germen, a germ; caedere, to kill.) A microbicide; an agent that destroys germs."

"*Disinfectant*—an a. and n., of French origin, as an a., serving to disinfect; disinfecting." "*Disinfect*, v. t.—to cleanse from infection; purify from contagion or infectious matter; destroy the germs of disease in." "*Disinfectant*, as a n.—An agent used for destroying the contagion or germs of infectious diseases—and adds *deodorizers*, or substances which destroy smells, are not necessarily disinfectants, and disinfectants do not always have an odor." (C. D. and C.)

"Deodorizers are not necessarily disinfectants, and why? Because many potent deodorizers are not germicides; do not destroy germs—the direct cause of putrefaction by which process odors are evolved." "Disinfection consists in the destruction of something infectious, and we fail to see any justification for the popular use of the term which makes it synonymous with deodorization." (*Science, VI, 328.*)

Gould says of *Disinfectant*—"An agent that destroys disease germs and noxious properties of fermentation and putrefaction. *Disinfection*, the destroying of disease germs, by whatever means." I believe the use of this term in a general way should be chiefly

confined to the cleansing of a sick-room after a case of small-pox, for example; and in dentistry to the surgical cleansing of instruments and other appurtenances, such as cuspidors, saliva-ejectors, etc., rather than to the cleansing of pulpless teeth and other work of this character. However, I feel that an exclusion of its application in this connection is not wholly justified. When the term is thus applied I believe we should ascribe to it a broad meaning, including the entire cleansing process, that of antiseptics, germicides and deodorants.

Septic and *infectious:* "*Septis*, n. (Gr. putrefaction and make rotten.) 1. Putridity or putrefaction; decomposition; rot. 2. Contamination of the organisms from ill-conditioned wounds, from abscesses, or certain other local ptomain-factories or bacterial seminaries; septicemia. It includes, of course, similar conditions produced experimentally by inoculation." (C. D. and C.) Gould says: "*Sepsis:* A toxic or putrefactive condition. Infection by pathogenic germs." "*Septic*, a. and n. (Gr., characterized by putridity, to make rotten.") "T. a.—Of or pertaining to sepsis in general; putrefaction or putrefying; septical; opposed to antiseptic. D. N.; a substance which causes sepsis." (C. D. and C.) Gould says: "*Septic:* Relating to putrefaction. Septic infection—infection with pathogenic microorganisms. Septic intoxication—absorption of septic matter."

"*Infection*, n. F. The act of infecting." (C. D. and C.) Gould says: "*Infection:* The communication of disease, germs or virus, by any means, direct or indirect." "*Infection*, a. F. Communicable by infection; easily diffused or spread from person to person, or from place to place, as a disease," etc. (C. D. and C.) Gould says: "*Infectious:* Having the quality of transmitting disease, or the agents that cause disease."

From a close analysis of these definitions, and also because of the fact that in the early use of these words a distinct difference in meaning was recognized and ascribed to them, it is my judgment that we should not use the terms as synonymous expressions at the present time.

When the proper class of microorganisms is brought in contact with dead pulp tissue under favorable conditions the process of putrefaction is inaugurated; various gases, according to the different elements present, are generated, and the entire mass of dead

tissue is transformed into what is properly termed infectious material, which means in this connection simply material that contains the necessary elements to infect, or to cause to become diseased tissue otherwise healthy. In the early times, comparatively speaking, before anyone possessed knowledge of microorganisms, all pathological conditions of dead matter were referred to as septic. However, after the dissemination of information regarding microorganisms and their influence in producing disease, the word "infectious" came into general use for reference to dead matter that had been invaded by microorganisms, or in other words, that possessed the necessary element to enable it to transmit disease to otherwise healthy tissue. The term "septic" was thenceforth used in a restricted sense. Permit me to illustrate: A felon occurs on one's finger, or a boil any place on the hand or arm; pus microorganisms are present and pus formation takes place. In order that other tissue may be infected by this pathological condition it is necessary that a portion of the liquid—the pus containing microorganisms—or the microorganisms themselves (this constituting infectious material) shall be brought in contact with it. But there are other elements being continually formed—ptomains, waste products, which within themselves contain no microorganisms. The human economy is constantly endeavoring to rid the system of these substances. They are carried away from the suppurative process through the channels of the lymphatic system of vessels. The lymphatic glands at the elbow, or more especially at the axilla, become inflamed, sore and swollen as a result of the poisonous waste material passing through them. This material, however, does not possess living germs, so that suppuration will not occur in the glands unless the infecting element—microorganisms—is brought in contact with them through some other channel. This is *septic* material, and thus in this restricted sense should the term "septic" be used at the present time.

The terms *antiseptic*, *germicide* and *disinfectant*, in my judgment, should not be used synonymously. The sharp distinction in the root-meanings of the terms, especially of *antiseptic* and *germicide*, should make it clear to all thinking minds that they should be used separately and distinctly as to meaning and application.

This phase of the subject also carries us back to prehistoric times, so far as microorganisms are concerned. Up to the time that

pathogenic microorganisms and their connection with disease was understood the term "germicide" was not in use. "Antiseptic" and "disinfectant" were the only expressions in use in this connection. The word "antiseptic" was used with reference only to those medicinal agents which prevented the decay or the decomposition or putrefaction of the various substances. "Disinfectant" was used to designate those medicinal agents which would not only prevent the further decomposition of these materials and the formation of gases and mephitic odors, but which would also destroy the noxious properties of fermentation and putrefaction. After a knowledge of the existence of pathogenic microorganisms was had, and their relation to the causation of disease became familiar, the word "germicide" came into use. This term was used to designate medicinal agents that would not only prevent the decomposition and putrefaction of substances through the agency of microorganisms, but that would destroy the life of the germs themselves. With substantially those meanings should these terms be used at the present time, except perhaps, as stated above, a broader significance should be ascribed to the word disinfectant.

The term *antiseptic*, as applied to medicinal agents, should be, in my judgment, used only in the sense of preventing the development of microorganisms—preventing putrefaction of nitrogenous substances, by holding in check the development of germs. It will be readily understood that all germicides are antiseptics, but that all antiseptics are by no means necessarily germicides.

Discussion. *Dr. J. E Hinkins*, Chicago: I agree entirely with what Dr. Peck has said, and I believe the time has come for an intelligent classification of these terms. I can offer nothing original except to discuss for a moment the necessary action of an antiseptic or a disinfectant. It seems to me that there must be two distinct actions, one mechanical and the other chemical, and I cannot explain them better than by quoting from a paper by Dr. Cook: "Before going further we must have a clear idea of the terms antiseptic and disinfectant. While all chemical substances having the power of destroying bacteria and their spores are termed disinfectants, it necessarily follows that in weaker solutions they may only inhibit the development of bacteria and thus be termed antiseptics. On the other hand, it does not follow that all chemical substances which are capable of inhibiting the growth of bacteria are capable,

in stronger solutions, of detroying them altogether. It is well known that sugar and many of the volatile oils will not permit the growth of bacteria, but have no power, no matter how concentrated, of destroying them or their spores. Such substances are only antiseptic. A one per cent solution of carbolic acid may only inhibit the development of bacteria or act as an antiseptic, while a five per cent solution will kill the bacteria or their spores. We will have little to say concerning the true antiseptics, but wish to speak particularly of chemical substances which in weak solutions have an inhibitory action and in stronger solutions are disinfectants or kill germs and their spores.

"What I mean by this term is an antiseptic that will act upon microorganic cells before it does upon the cells of multicellular life, for it is a well-known fact that the animal cell is more easily affected by poisonous agents than is that of the lower forms of vegetable life. We should if possible get a better agent than the essential oils that have been so universally used for years, because of their great irritating properties to the higher cell organism. Further, their antiseptic properties are due more to the mechanical than to the chemical action."

Dr. G. V. Black, Chicago: At least two of the three terms were in use before we knew of microorganisms, and after we did it was necessary to have another term with a meaning not covered by the first two. All these words are used very loosely by both physicians and dentists, and even the dictionary-makers do not always follow strictly the root meanings. The compilers are instructed to give the root meaning of these words, and the interpretation as they find them used by the best writers in medicine for instance. Consequently, if a prominent medical author has used a word wrongly it goes into the dictionary that way. Thus medical nomenclature is being most fearfully mixed up, and students are having a hard time to understand what is meant by a word when it is used in different significances by various men. We should have more exactness and a better understanding in the use of these terms, confining their meaning to the original significance. They have been gone over correctly in the essay, so I will not repeat. I can only commend Dr. Peck's ideas and urge all of you to look into the matter more earnestly in the future, being careful that you use these terms according to their root meanings.

Dr. T. W. Brophy, Chicago: As regards nomenclature, we are drifting away from the established and accepted usages of the medical profession, especially in the terms employed in anatomy and physiology. Those who attempt to make reforms should keep in mind that the work in anatomy, chemistry, physiology, materia medica, etc., upon which we build our profession, should not be disregarded. I believe it is only complicating matters to present to students a new name which does not answer the purpose any better than the old one. The making of new expressions, names, etc., should never be done except by the consent of a board or committee.

Dr. Edmund Noyes, Chicago: I did not understand that any new terms had been proposed in the essay. The importance of this subject and also the difficulty of it are in its application. It is very desirable that these accurate distinctions of meaning should be carefully instilled into the minds of students and practitioners. The first difficulty is, that so many things can be described by both names, i. e., a great many antiseptics are germicides as well, so it must be made perfectly apparent whether it is the antiseptic quality or the germicidal effect that we are talking about. If we could have classes of substances which were antiseptics only and not germicides, and disinfectants only and not antiseptics, it would be easy to make these distinctions sharp and permanent.

Dr. G. W. Cook, Chicago: I cannot see wherein we are going to make a sharp distinction between these terms. It has not been done by the best writers nor by the men who have been working constantly along this line in the laboratories. I should be glad if any one would suggest a method by which we could do such a thing, because I agree with Dr. Peck, that the terms as used are confusing, but as this matter has been worked upon industriously and intelligently by some of the best men, and as they have been unable to make a distinction, it seems perfectly absurd for the dental profession to consider the adoption of an absolute classification.

Dr. Peck, closing discussion: The disposition shown by some individuals to lead away from the subject under discussion is something that should not be tolerated. It was not my intention in this paper to introduce any new terms, nor did I do so. My desire was to bring some sort of order out of the chaos in which the terms in question now are. Our best authors may use them interchange-

ably and synonymously, but by what right do they do it except that of custom, and custom is not always a safe guide to follow. The writers of early days used what terms they had in the original sense and with something like accuracy, but as time has gone on and our knowledge of these matters has broadened, other terms have come forward and we have simply become careless in their use. Dr. Cook states that it is difficult to draw the line where one word ends and the other begins. That is true, but the time has come when a start should be made in this connection, and that is all I intended to do in my paper. I really expected that the ideas presented would meet with more opposition than they have, so I am pleased to note the favor with which they have been for the most part received. I did not suppose that the outline presented would be adopted absolutely, but I believe if it were followed we should have a great deal better understanding of one another's speech and writing than we have at present.

CEMENT ANCHORAGE FOR FILLINGS.

By J. J. Reed, D.D.S., Rockford, Ill. Read Before the Illinois State Dental Society, at Rockford, May 14–17, 1901.

The use of cement as an anchorage for fillings is evidently not very general, although we occasionally find an article in the journals in which this method is described and recommended. In looking up the literature of the subject we find in the transactions of the Florida State Dental Society, which appeared in the August, 1888, *Cosmos*, a paper by Dr. W. E. Driscoll on this method. He says, "It is my custom in filling frail teeth where anchorage is doubtful to line the cavity with sticky cement, thus improving anchorage, strengthening weak walls, preventing discoloration and thermal shock, and making a water-tight filling." He writes again in 1890, "To keep the method before the profession, as I am convinced it is of far greater importance than many will at first believe. I do not remember of losing a filling in five years' experience with this method, and I have filled teeth that I considered not worth filling with either material alone."

In *Items*, Sept., 1897, we find an article by Dr. James Magee of St. John, New Brunswick, "I mix the cement to a thick creamy consistency and apply over cavity walls, then introduce the amalgam and work it with instruments till cavity presents only a metallic

lining. I wish only the merest film of cement. Then fit matrix and fill as usual with amalgam. Among the advantages are—It retains filling, prevents tooth discoloration, is a good non-conductor, and with it recurrent caries progresses less rapidly. In pulpless teeth the support received from cement is of the greatest benefit, because the longer a tooth is pulpless the more brittle it becomes."

One method has been to mix the cement and amalgam separately, then incorporate them, getting a putty-like mass, and insert in the dried cavity. This is not the method advocated, as it goes only half way; we get neither the full adhesion of the cement nor the permanency of the amalgam. Dr. H. B. Tileston of Louisville, after using this filling for five years, read a paper on the subject before the Kentucky State Society, which was published in the *Review*, August, 1888. Dr. Sachs of Breslau, published this method in Germany. In the *Cosmos*, January, 1890, is an article entitled "Alloy-Cement" by C. B. Parker of Brooklyn, on this method. He claims to have used it as early as 1885. In the *Cosmos*, May, 1890, Dr. L. W. Skidmore of Moline, Ill., gives Dr. Tileston credit for first publishing the method, and says, "I use it in cavities difficult of access or too sensitive to give necessary anchorage."

Dr. Ottolengui in *Cosmos*, 1892, writing of cement anchorage for gold fillings, says, "Line with cement, crowd in two or three annealed pellets of crystal gold and wait till cement sets, then the gold can be compressed and built on as usual. Having passed through all the stages, beginning with ridiculing the method, I have almost reached the point where I use it exclusively." Dr. Van Orden of San Francisco, in *Cosmos*, 1894, writes of "using cement as an anchorage for gold fillings in shallow cavities, as it adds remarkable strength to the operation. The new mat gold is most suitable, and the effects from thermal change are reduced to a minimum." In *Cosmos*, 1894, we find a paper by Dr. I. C. St. John of Minneapolis, in which he advocates "thin cement as an accessory anchorage. No one should ignore any means by which the desired end can be more readily and perfectly attained, especially when the patient will be the gainer. . . . It should be remembered that the same rule holds good here as in mending broken china, namely, that excess of cement does not give a more perfect joint."

In *Cosmos*, May, 1898. Dr. H. S. Lowry of Kansas City, writes of cement anchorage for gold fillings. His method is, "To mix a slow-setting cement to consistency of thick cream, place in cavity and rapidly pack large pellets into cavity, first using hand pressure, then the mallet, being careful to force gold in contact with margin of cavity, after cleansing margins. The cement at this stage of the operation would be in a state of advanced crystallization. No cement should be exposed at cavity margins. This practice compensates for that much talked of lack of adaptation. It binds filling and cavity walls together, thus giving additional strength, affords better anchorage and necessitates less undercutting, saving patient pain, and filling can be placed with more comfort and in less time." He places the amalgam filling in essentially the same way as by the Driscoll method. Dr. Lowry further says, "The most skillful operator will get the most perfect results, but my object in writing is to advocate a method by which every dentist may expect successes to which he has been hitherto unaccustomed."

A late article on the subject is one in the *Cosmos* for last March, by A. G. Bennett of Minneapolis. In summing up the advantages he says, "It makes a perfect joint, an adhesive anchorage, is a non-conductor, adds strength to the teeth, avoids pain and is a time-saver. The objection that this practice leads to careless and rapid operating because of its facility need hardly be considered by careful and conscientious men. The greatest success by this method cannot be obtained without the utmost care and precision in every detail of the operation. I use this method in nearly all cavities and consider it par excellence for teeth of poor quality." Dr. F. S. Fosheim of New York writes in the *Items* for Oct., 1900, on "Oxyphosphate with Gold and Amalgam." He uses a thin coating of thick creamy mix, carried on a small round burnisher. Crystal mat gold is used, and the first piece is large enough to cover the entire cavity walls. It is worked to place with large pear-shaped points, using hand pressure. He says, "The most important point is to use no more cement than will unite the gold to the tooth. I have practiced this for eight years with universal success."

In preparing cavities for this method carious dentin should be removed and the margins extended to where they are safe. Cut to a convenient form, but for anchorage depend almost entirely on the cement. Carefully shape all enamel margins. For amalgam filling

mix amalgam as usual. The cavity being dry, make a small mix of rather thin cement and line the cavity walls. Place a pellet of amalgam in the cavity and spread it over the cement, pressing and rubbing it into the latter, crowding out the excess and forcing it into closest contact with cavity walls, add more amalgam until we get a metallic surface, then clear extreme margins of any cement, adjust matrix and proceed as usual.

In using this method with gold, prepare cavity as described. Make a small mix of thin creamy cement, and with a small spatula or burnisher carry a tiny bit of the mix and spread it over the cavity walls. Then cover the cement with a layer of No. 1 Solila gold and press to place with a medium-sized plugger, using pressure at right angles to cavity walls, going over it lightly at first and gradually increasing the pressure; then put in another layer and condense well, using hand pressure. Use enough gold in this manner to get a good all-gold, well-condensed surface. Next use some sponge gold, which gives a good foundation, and proceed as usual in gold filling, with any gold desired. The Solila is non-tipping and seems best to start with. The sponge gold shares this property, and with it a good foundation can be made for cylinders or other gold. It is surprising with what confidence one will do hard malleting on this anchorage after a few trials. The extreme margins must be cleared of any cement, and in the finished fillings no cement should be exposed. By this method we get anchorage even on enamel, except on extreme margins.

The tendency at first is to use excess of cement or to mix too thick, which must be guarded against. One need not wait till the cement hardens after getting the cavity lined with gold. If there is more than a mere film of cement under the gold it may move under heavy malleting. The gold should be almost in contact with the cavity walls. Use hand-pressure until a foundation is made. There seems to be no limit to the use of this method in amalgam fillings. To get the best results in gold work it is necessary to condense nearly at right angles to cavity walls. This is possible in almost all cavities, except some disto-proximal ones in bicuspids and molars. In these cases we might use the back-action pluggers. If a cavity is extended for anchorage the cement will assist retention, as in a groove in the cutting edge of an incisor. The larger the cavity surface the better will be the anchorage.

The advantage of this method may be summed up as follows: First. It avoids the necessity of shaping for retention or making undercuts, or it may be used in combination with other anchorage that might be considered insufficient, and in cases difficult of access. Using cement we secure anchorage over all the cavity surface, even to the extreme enamel margin. The stability of this is manifest if we but think how few cement fillings fail on account of anchorage. Another example is the retention of inlays, but the cement under an inlay is not forced into closest contact, as it is under each thrust of a plugger-point. Second. It saves the patient suffering. Who of us does not study to make operations as free from pain as possible? Usually the most painful part of cavity preparation is shaping for retention and making undercuts after the carious dentin has been removed. By cement anchorage this most tedious part is made unnecessary. It also saves time for both dentist and patient. Third. Cement being a fair non-conductor, it makes a cavity lining that lessens thermal shock, hence there is less liability to subsequent pulp trouble. Fourth. It saves tooth structure, retention grooves, and cuts off communication of dentin with pulp. Fifth. It is observed that recurrent caries is rarely found in cases of inlays, and the same may be said of cemented fillings. The reason seems to be that the cement is in perfect contact with the walls—the result of perfect adaptation—which is so difficult to achieve with the ordinary gold or amalgam filling. Sixth. In amalgam filling it prevents discoloration of the tooth by precluding leaky fillings, which are probably the cause of tooth discoloration. The amalgam being securely cemented to cavity walls, if it spheroids, flows or changes form it does so on its free surface, but cannot part from the walls.

Some might object to this method, thinking of the effect of the cement on the pulp, but it seems to be the opinion of our best men that we need fear nothing on this account. In our superior and latest cements there is no danger from arsenic. If we have trouble it is more apt to be from infected dentin left in the cavity or from pulp-irritation previous to filling.

Discussion. *Dr. W. V-B. Ames*, Chicago: I have some confidence in this method, but should criticise any man man who uses it in almost every case. I employ it most frequently in those sensitive labial or buccal cavities where, after a thorough removal of the carious dentin, we have a shape which lacks anchorage for a gold

filling. However, by starting with cement we can have the filling satisfactorily locked by the time the natural anchorage is reached. Anyone who has had much experience with inlays should at least give the method a trial. I do not advocate having any amount of cement exposed at the margin, but should not object to a mere film there, for we know that an inlay adapted as accurately as any such filling would be, and having just a trace of cement at the margin, would be absolutely safe.

Dr. Peters of Syracuse, N. Y., read a paper in 1884, in which he touched slightly on this method and advocated the practice of returning to the cavity a gold filling which had come away from lack of anchorage. In a later essay he gave his further experience, becoming quite enthusiastic over it, and a few days ago he told me that in certain cases he had great confidence in the method, resulting from years of use.

In regard to caries recurring about a filling of this kind as compared with one in which no cement has been used, my experience with inlays has been that recurring caries does not undermine an inlay as it does a gold filling, nor have I ever seen so much recurrence about the former as around the latter.

Dr. S. F. Duncan, Joliet: Something was said about cement fillings never leaving the walls of the cavity. That is true, but they have a firmer grip on the walls than fillings made in this way if you cut the cement away from the margins. Yet there should be strength enough in the cement to hold a filling if the union is good between it and the metal.

Dr. C. C Corbett, Edwardsville: If there is no objection to cement under inlays, why should there be any to the same material under fillings? As I understand it, Dr. Reed lines the entire cavity at once, but I never do this except in small cavities. When I have a medium-sized one prepared I line the deepest portion of it with a sticky cement and then introduce large pellets of gold as rapidly as possible, condensing them thoroughly. When the cavity is about one-third full I scrape away any surplus cement and cover the margin of the enamel with gold, then line the next portion of the cavity and start with a large pellet of gold on that already introduced, pressing out the surplus cement. In this way I avoid getting any on the gold already introduced. In large fillings I use three or four mixes of cement, lining only so much of the cavity as

can be readily covered with gold before it begins to harden. I believe that if badly decayed and devitalized teeth are lined with cement they will last much longer than when this is not done.

Dr. J. D Patterson, Kansas City, Mo.: I found this method unsatisfactory many years ago, and believe you will also after experience, as it gives an insecure foundation. Furthermore, I don't believe cement is a good non-conductor. If a pulp needs something badly it should be taken out, but if you wish to give just a little protection, non-cohesive foil is the best thing to use. When a thermal change strikes those layers of foil, there being no intimate connection between them, it is conducted laterally and not towards the pulp, as in a cohesive foil filling.

I should not advocate to students the use of cement for anchorage of fillings, as the cavity should be made of a retentive form, so that we do not have to depend upon a delusive anchorage. Some have said that the method under discussion does not necessarily lead to a careless manner of operating, but I have seen it do so again and again, and believe it will usually result in slovenly operations. It is not a retention that I desire for permanency, but I do sometimes use cement under amalgam for a lining upon the labial or buccal wall, so that the filling will not discolor the tooth.

Dr. Reed, closing discussion: Dr. Patterson did not say whether he disapproved of the method because of recurrent caries or insufficient anchorage. When he gave this method up years ago as unsatisfacfory the cements were greatly inferior to those of to-day. I have been working along this line with amalgam fillings for over ten years and believe the anchorage is as good as can be obtained, and this is the important point. Although the cement is used for anchorage, it is a better non-conductor than any metal.

USE AND ABUSE OF AIR CHAMBERS.

By A. O. Hunt, D.D.S., Chicago. Read Before the Illinois State Dental Society, at Rockford, May 14–17, 1901.

By an air-chamber I mean a device made of metal of about No. 20 gauge, made in the form of a parabola with horizontal base and edges slightly beveled. Occasionally for artistic effect it is made heart-shaped, etc. This is to be placed somewhere on the palatal surface of a denture, or instead of using metal for the purpose, the form desired may be cut in the impression.

The object and purpose of the air-chamber so constructed are, that the margin of the space thus produced in the plate shall have perfect contact with the underlying tissues, thus causing an open cavity within these margins from which the air may be exhausted. In this manner it is expected a vacuum will be produced that will hold the denture in place. The scientific principle intended to be applied is one of atmospheric pressure. I think without further discussion it is sufficient to say that it is generally conceded to be inoperative.

The use of the air-chamber is old and came at a time when the materials for getting good impressions of the mouth were very limited and faulty in the extreme. Like many other things, it seems to have come to stay, regardless of some very important facts. In the majority of cases it is used simply because of custom or habit. It is also employed with a total disregard of the variations existing in mouths, and certainly with a deficient knowledge of the anatomical conditions that are always present. Its use has come to be merely mechanical; its position and shape indefinite and without purpose, except it may be that one shall be used.

It would seem, considering the advances made in other departments of our profession, that this question should have partaken of some of that spirit and been settled long ago. Whether or not it will ever be decided is important. It will not be until the profession is conscious of the fact that mechanics alone does not cover the field embraced in the term "prosthetic dentistry." After all that has been said and written upon the methods of retaining dentures, whether it is atmospheric pressure, capillary force, adhesion, etc., there is a common agreement that when perfect adaptation is secured the best conditions prevail and the desired result is accomplished. I think we can find no better term than adaptation to express what we mean, but much more should be understood by it than now. The denture should be adapted to all parts of the oral cavity which can in any way affect the retention or displacement of it. Let us consider what these may be. For a full upper denture we have the hard and soft tissues of the palatal portion, the attachments of the muscles along the buccal and labial border, including parts that do not vary materially and some that are constantly changing. If then we can secure an equal bearing over the hard and soft spots alike, a firm resting-place for the denture on those that change the

least, a freedom of movement for the muscles that are likely to displace the denture, employing those that will retain it, we are working upon an intelligent basis with every promise of success.

In the first place, compensation must be made for the hard and soft tissues, either on the cast or in the impression (both of which are in a measure faulty), for the greatest pressure or bearing on those parts that yield most readily. This to be found out by a careful digital examination of every spot upon which the denture is to rest, careful notation of the existing conditions being made upon diagrams. After this the margins of the plate should be located definitely, so that they will surely be in close contact with the tissues at all places where the muscles do not interfere.

Next, those portions of the upper jaw that undergo little or no change—five in all. The palatal portion of the mouth, the region of the malar process backward above the maxillary tuberosities, and the cuspid eminences. In the lower jaw are four—the space between the attachment of the buccinators and the top of the alveolar ridge, and the corresponding places below the inferior cuspids.

The muscles of expression all anastamose in the orbicularis oris of the mouth. If one moves they all move; they are in constant motion, and unless an entirely free movement is allowed them, they are quite sure to displace the plate. In the upper jaw we have no depressor muscles, but after loss of the teeth, the cuspids especially, the orbicularis muscle droops o a considerable extent, carrying all the others with it, and unless this is brought back to its normal position by extreme elevation at the cuspids and at the region of the tuberosities, this excess of loose inactive muscular tissue hangs as a dead weight on the outer rim of the plate, and at the slightest movement of the facial muscles acts as a force to displace it.

In the lower jaw we have no elevating muscles on the outer margin. Along the lingual border we have the mylo-hyoid, extending on both sides, the sublingual, the attachments of the genio-hyoid, and the glossus muscles, which in action lift the denture from the gum. In forming either the upper or lower plate the shape should be such that the buccinators will be one of the great factors in retaining same in position.

In regard to the others whose movements are detrimental, a place should be made in the plate for the full action of all these muscles

where the margin extends over and above them. In this manner the whole surface of the denture from margin to margin becomes one great air-chamber, and to displace it force in proportion, as compared with the little one put haphazard anywhere on the palatal surface, will be required.

There is one class of cases in which the use of an air-chamber may by warranted, for the reason that there are no varying hard and soft parts. Here the device is of a temporary character only, and should be made very shallow and large and of a shape to conform to the space between the posterior margin and the base of the alveolar border on the lingual sides. I speak of those places where there is a layer of soft tissue, so thin that it has no elasticity, overlying the bone. In this instance, however, if the plate is shaped over the tuberosities and the cuspids with wide flanges, the buccinator and orbicularis muscles will grasp the plate firmly to prevent any movement of it.

Occasionally patients are not satisfied unless they see the mark of the air-chamber. Then an imitation may be produced which will answer all purposes yet have none of the objectionable features of the appliance.

In compensating on the casts a "relief" is sometimes used, and by some is designated an air-chamber. If it is employed to raise some hard part of the cast, and its edges conform to the tissues, it cannot in any sense be called an air-chamber, as in a very short time the portion that has been raised will be in contact with the tissues underneath.

After all, the most important point in the construction of a denture is the securing of a good impression. While plaster is undoubtedly the best material for this purpose, it will not give what is desirable in the first effort, as it does not push or lift the lips and cheeks back to a normal position. The only method I have of accomplishing this is to take an impression, make a cast from it, cut above the margins so given in the region of the cuspids and over the tuberosities sufficiently to carry the impression material high up in those localities; then form a tray of modeling compound over this cast and take a second impression, which will give the result desired.

Discussion. *Dr. T. W. Pritchett,* Whitehall: I have formed these so-called air-chambers in most of my plates for years, and

usually regretted their omission if I did not do so, for if some provision were not made for the shrinkage of the ridge and the plate coming in contact with the central portions of the palate, I should have to make it afterwards. I have made these excavations for future needs rather than for usefulness at the immediate time, not believing that they produced any amount of atmospheric force.

Dr. G. M. Brunson, Joliet: A properly constructed air-chamber is an excellent thing. In the first place, it aids in holding the plate in place when the patient is beginning to wear it. Second, having it the plate is less likely to drop during the sudden expulsion of air, as in sneezing. Third, when the mouth begins to shrink the air-chamber helps to hold the plate in place. Fourth, it takes the bearing off the hard part of the palate. Most air-chambers are too deep, and many of them are out of proportion to the size of the plate.

Dr. W. V-B. Ames, Chicago: I would especially commend Dr. Hunt's remarks about securing an accurate impression, also his method. When a patient has a denture which at all approximates the shape of the mouth it is generally too short at the heel, and I can save taking an extra impression by building the plate out with wax and taking an impression over it. Dr. Hunt states that there must be snug contact to the margins, without explaining where those margins should be located. He says that you must free the region of the muscles to allow their thorough play without any traction upon the plate. He further states that there are exceptional cases where air-chambers are called for, those where soft tissue cannot be secured for the location of margin of the plate. Worst of all, he said he would sometimes put an air-chamber in the plate to please the patient.

There are no exceptions to my rule of making entire dentures without air spaces, as I do not believe in those plates which are supposed to be retained by atmospheric pressure, capillary attraction or whatever you choose to call it. The reason why I object to an air space beneath the plate is because air is elastic as compared with fluid. Take an empty hypodermic syringe and draw the piston back a little way, then close the opening and you can readily draw the piston to the end of barrel, expanding the air within it. Next fill the syringe half full of water, close the opening, and see how far back you can pull the piston. This is just why I do not

wish air beneath the plate, because in all cases if you locate the margin of the plate at such points you have beneath it elastic tissue. If you will simply go far enough back in the throat to reach elastic tissue, and locate the edge of the plate there, having turned it up sufficiently, there will be no trouble. If a plate is made from a good impression and is properly adapted, you have no air under it after pressing to place. If any space exists it should be filled with water. The lips and cheeks lie over the edge of the plate from one tuberosity to the other, and if you have so treated your model that the posterior margin, outside the tuberosities, displaces soft tissue from one-sixteenth to one-eighth inch, varying with the laxity of the tissue in different regions, that plate must have a force applied upon the front or side teeth sufficient to draw it away from the posterior region one-sixteenth of an inch to admit air at the point where you had turned up the edge the least. The average mouth has a horizontal surface of four square inches and an atmospheric retention of fifteen pounds to the inch, giving sixty pounds retentive force, and I do not think a denture is often made which would withstand the application of sixty pounds pressure upon the incisors or cuspids. If sufficient force were applied to an incisor or a cuspid to displace a plate such as I have described, before it could leave the roof of the mouth there would be blood cupped from the capillary vessels. Of course there is never a vacuum beneath this sort of plate, for if there were it would rupture the blood-vessels.

To explain this further, when such an impression is taken as Dr. Hunt has described, where the space between the lip, cheek and alveolar ridge is filled with plaster, and the tray has been so shaped that it will carry the material entirely around the tuberosities, and the plaster presses on the palate sufficiently to slightly displace the soft palate all the way across, you cannot remove that impression from the mouth until you have lifted the lip at some point sufficiently to allow air to pass over the margin. A plate made as described is difficult to remove, and it is often necessary to tell the patient how to do it. An air-chamber in the hands of a man who believes in it is a good thing and will undoubtedly help his patient to become accustomed to the plate, but if the plate without an air space fits properly the patient cannot help but become accustomed to it.

Dr. E. H. Allen, Freeport: Dr. Ames is quite correct. The idea of an air-chamber is to exhaust the air under the plate so that the atmospheric pressure on the outside will hold it up, but if you have air in the space the outside pressure will not do the work, so what is the use of the air-chamber?

Dr. Edmund Noyes, Chicago: I have difficulty at two points—the frenum and median line, as I sometimes find it difficult to construct a plate that will not leak at those points or else hurt the tissue.

Dr. Ames: Do you cut away rather freely for the frenum? If so, I should be afraid of a leak. If I allow the muscles and frenum to simply lie in soft plaster, taking the impression with a tray which does not distend the cheek or lip at all, I chamber only back from the extreme depth of that depression so that the muscle will lie smoothly upon the plate without irritation.

Dr. Noyes: I always try that, yet the patients come back with the muscles sore and I have to trim again.

Dr. Ames: It is a matter of having contact of soft tissue upon the margin of the plate which is not broken in ordinary movements of mastication and speech, and except in extreme cases with a very shallow rim I do not expect a leak at those points.

Dr. Hunt, closing discussion: I am greatly obliged to Dr. Ames for his discussion, but he has evidently misunderstood me on some points. For twenty-two years I have preached against the use of an air-chamber in any condition of the mouth under any circumstances. Dr. Ames is right in saying that the whole periphery of the denture must be one great air-chamber, so to speak, and perfect adaptation must be secured. All the muscles in the mouth move at once, and every one of them comes into the orbicularis oris. In the loss of the cuspid teeth particularly there is an extreme drooping of the mouth and of this muscle. Now, there are no muscular attachments over the cuspid eminences. The purpose of these latter is to act as the pulley-block for the muscles of the orbicularis oris, holding them up under the alae of the nose. Consequently, the denture must be carried up high enough to keep those muscles where they belong, or else you will have a mass of muscular tissue overlying the margin of the plate and pushing it downward out of position. If this is done none of these muscles can produce a depressing motion.

PHYSIOLOGICAL FUNCTION OF THE SALIVA.

By J. B. Dicus, D.D.S., Chicago. Read before the Illinois State Dental Society, at Rockford, May 14–17, 1901.

Before taking up the physiological function of the saliva, a few words relative to its origin and the glands secreting it would not be out of place. The saliva is secreted by the parotid, submaxillary and sublingual glands; these differing in their histological structure and appearance. In the parotid gland the lumen is quite small and the cells are columnar, with granular nuclei and intranuclear network. During rest it swells up, its appearance being much different from that after secretion. The secretion is thin and a true type of salivary ptyalin.

The sublingual gland is a true mucus-secreting gland, the lumen and cells being larger. The largest ones are filled with mucinogen, which is transparent. The smaller ones are the semi-lunes of Heidenhain. The secretion from this gland is thick and sticky, which gives rise to the fact that the lumen is large. The amount of ptyalin secreted by this gland is very small, the submaxillary being the mixed gland, secreting a thin liquid containing ptyalin and mucin.

The salivary glands send their secretions through the various ducts, and the saliva as found in the mouth is a mixture of these secretions. Ordinarily the saliva is frothy, caused by the mucin surrounding the bubbles of air, giving it a soap-bubble appearance. The saliva in the mouth contains many epithelial cells and much proteid, which are the productions of the glands and cells. It is alkaline in reaction, due to the alkaline salts, and its specific gravity is about 1005. It also contains corpuscles from the mucous and tonsilar glands. There are also always present numbers of microorganisms. Chemically, the saliva is composed of 994.10 parts of water and 5.9 parts of solids; the latter being made up as follows:

Ptyalin, which comes from the glands	1.40
Fat	.07
Epithelial cells, proteids, mucin, etc	2.13
Salts	2.29

These salts are as follows—sulphosyanate of potash, which is a peculiarity of the salivary gland, not being usually found in the secretions of the body, phosphate of soda, phosphate of calcium, chlorid of sodium, chlorid of potash and phosphate of magnesia.

The amount of saliva secreted by the glands is from one to three pints daily. This at first would seem enormous, but when we take into consideration the various uses which are called into play it does not appear so.

The uses of the saliva may be grouped under two general heads: (1) the mechanical, taken as a whole, irrespective of the amount of ptyalin, (2) the chemical or digestive action of the ptyalin itself. Taking the mechanical uses, of which we find a great many, the most important are: (1) its lubricating quality, as in the case of speaking, for the orator frequently finds that the rate of secretion diminishes after he has spoken for some time, so that he has not a sufficient amount of liquid in his mouth. He is not able to get his words out, nor to twist his tongue with sufficient rapidity to speak well, hence the glass of water at his side. On the other hand you may have had a nervous affection of the saliva in your schoolboy days when you got up to recite. Because of the nervous tension under which you were laboring the mouth would fill with saliva and you would have to swallow before you could continue.

The salts with water form a good solvent for various substances which must be dissolved before they come in contact with the nerve filaments of taste. This is shown in sickness, as when the tongue is coated and the substances cannot reach the nerve filaments, there is no sense of taste. Therefore it is essential that substances be mechanically dissolved by the saliva before they can be tasted. An important mechanical use of the saliva is lubricating the bolus of food which is to be swallowed, this being entirely distinct from the digestive action. You know if you eat dry substances, such as crackers, and do not allow plenty of time for the thorough mixing of the saliva with them it is almost impossible to swallow.

The chemical action of the saliva is due especially to that unorganized ferment, ptyalin, working on the cooked starch. Every diet to sustain life must contain proteids, carbohydrates, fats, salts and water. Carbohydrates and fats are theoretically indistinguishable but not practically so. As previously stated, the ptyalin is concerned only with the digestion of starch. The latter must first be cooked in order to be acted upon by the ptyalin, so that when we speak of the action of the latter we mean on starch, this reaction being chemically as follows:

Starch.	Water.	Ptyalin Maltose.	Achroodextrin.
$10(C_{12}H_{20}O_{10})$	$+ 8(H_2O)$	$= 8(C_{12}H_{22}O_{11})$	$+ 2(C_{12}H_{20}O_{10})$

Starch.	Water.	Ptylin Maltose.	Dextrose.
$25(C_6H_{10}O_5)_a$	$+12(H_2O)_a =$	$12_a(C_{12}H_{22}O_{11})$	$+ {}^{a}_{b}(C_6H_{10}O_5)_b$

This represents the products and byproducts of the action of ptyalin and moisture with heat upon starch. To explain—a carbohydrate is a compound of carbon, hydrogen and oxygen, having the hydrogen and oxygen in the proportion to form water, starches and sugars being examples of such compounds. There are various forms of starch, but their chemical formula is always the same. There are also various forms of sugar, such as ordinary table sugar made from beets, that made in the glucose factory, also that found in the crusts of bread. Each of these have a different formula, but any form may be changed into another.

Suppose we take ten molecules having the form of starch, with the formula $C_{12}H_{20}O_{10}$, add to them eight molecules of water, put this mixture under a proper degree of heat, say the average temperature of the body, 98.6 degrees F., and then add to that some ptyalin, coming from the ptyalinogeon granules of the cells in the parotid and submaxillary glands. This unorganized ferment causes a change, as under its influence the water is united with the starch and there results another body containing eight molecules of maltose ($C_{12}H_{22}O_{11}$), the process being one of hydration. Not all the starch is changed in this way, there always being some left. There will then be a remainder of the starch formula, but a different body ($C_{12}H_{20}O_{10}$), known as acroo-and erytho-dextrin. These dextrins will come in contact with more water and ptyalin and will be changed into maltose ($C_{12}H_{22}O_{11}$); and if there is still a little more left that will come in contact with a little more water and ptyalin and will be changed over, and so this process continues at all times. The maltose will be changed a little more completely possibly after it is in the stomach or when it comes in contact with the pancreatic secretion.

Dr. Takamenia made a test before the Mississippi Valley Medical Association one year ago in Chicago, to show the digestive action upon starch of diastase, a product which he discovered in plants, and which has the same effect as ptyalin. As diastase can be obtained in the open market I use this in the experiment, which I now repeat. First place a small quantity of cooked starch upon the glass slab and add to it a little of Lugol's solution, which is made

from iodin and potassium iodid. This gives a blue reaction. Now take another particle of cooked starch and add to it a little diastase, when by stirring the starch becomes thinner, signifying digestion of same. At this stage add a little more diastase, and there will be a little change of color from that shown in the starch test, it being more of a purple color. Now stir a little more, thus completing the digestion, and the bluish tint entirely disappears, giving a somewhat red color, which shows the absence of starch.

Noting how gradually the change takes place when the starch is acted upon by the ptyalin until it is converted into sugar; also the stirring which must be given the starch and diastase in order to obtain complete conversion of the latter, we see how very important it is that the food should be thoroughly masticated, so that the cooked starch may be well acted upon by the ptyalin, which is the first step in the process of digestion. There are three conditions essential to the best working of ptyalin: (1) a temperature of 98 to 100 degrees; (2) a slightly alkaline medium, as is normally the case in the mout; (3) removal of the by-products of the agent.

I now wish to call your attention to the nervous regulation of the saliva. From the following experiments we have certain facts and theories with reference to the nervous affections of the secretion of saliva. (1) Sapid substances placed on the tongue and tasted: (2) The odor of substances cooking. (3) The idea of a toothsome dish, as a description of a meal when you are hungry. (4) Stimulation of the mouth by substances other than sapid, such as the rubber-dam; (5) Hearing of the preparation of a meal, or the sight of delicacies when one is hungry—all will excite the flow, (6) Section of the nerve which passes to the salivary glands will interfere with the proper flow, and if this nerve be the chorda tympani there will result a more or less continuous flow of watery saliva, chorda saliva. If the peripheral end is stimulated the flow is increased, and at this time the blood-vessels passing to the gland dilate and more blood goes there. (7) If belladonna is given the mouth becomes very dry, and the secreting nerve is paralyzed and the saliva does not flow, although there is a dilation of the blood-vessels. (8) If you take the head of a beheaded animal and stimulate the chorda tympani the flow of saliva will continue, although there is no blood supply, until the material in the glands is exhausted. (9) If the sympathetic nerve which passes to the gland is stimulated there

will be constriction of the blood-vessels and still the flow of saliva, which is thick.

From the foregoing experimental facts we draw the following deductions as to the control of saliva. We have three sets of nervous fibers passing between the glands and the brain: (1) A set from all the senses which pass inward to the brain, the fifth nerve and the gasserian ganglion being the chief path of same. (2) Secretory fibers which pass to the nuclei of the secreting gland. (3) Fibers which are dilators or constrictors and pass to the blood-vessels, dilating or constricting them; the saliva being secreted by their action in the following manner: (a) There is an impulse passing inward over some sensory fibers such as the eye, ear, nose or mechanical touch, and exciting the centers of the secretion of the saliva. (b) There are going outward two sets of impulses: (1) One coming by the chorda tympani and ending in the secreting gland cell and exciting it to activity. . (2) One which comes down and dilates the blood-vessels of the gland, bringing some blood to the gland, which thus has something in this way to get blood to work upon, and the result is the pouring out of water from the blood-vessels which gives about 994 parts in a thousand of saliva, and the gland then secretes the peculiarities of the saliva.

I have called your attention to the importance of the thorough mixing of the saliva with the food in order that the cooked starch may be well digested. In connection let me mention the fact that the saliva is a culture medium for the growth of bacteria. Miller has demonstrated that dental caries is due to the production of lactic acid by the bacteria of the mouth. Slessinger has examined the action of the saliva in twenty-five pathological cases and found by quantitative analysis that the maximum action in health and in disease is about the same, but the minimum action in healthy individuals was higher by about 50 per cent. Kellogg in 1896 emphasized the necessity of attending to the proper mastication of the food. Cases of buccal or salivary dyspepsia show where there has been impeded starch digestion in the mouth which has led to disorders in the stomach.

Fenwick has demonstrated the presence of bile in the saliva in cases of biliousness, and in such cases often found bile there when it could not be so found in the urine. Dr. Cook has demonstrated that while the saliva is a culture medium of no little importance, the

morphology and virulence of bacteria are changed, and that it is a different medium in various persons, depending upon the characteristics and food of the individual, and that non-pathogenic bacteria may be changed into pathogenic in the same mouth. This he attributes to the osmotic pressure or changing the salts of the saliva, and if this is possible there is created in the mouth the worst possible condition for proper starch digestion, due to the increased acid reaction. He has also demonstrated the other forms of pathogenic bacteria may be found in the saliva even when the disease does not exist in the individual, as the pseudo-diphtheritic bacteria may be found in the mouth of a patient who does not have diphtheria, etc. Michael has contended that the saliva must be given as much attention in the diagnosis of general diseases as is the urine, but I cannot agree with him entirely, as the saliva is a physiological secretion while the urine is a waste product of cell metabolism.

I stated that the principal function of the saliva was to convert the starches into sugar, and this was found to be done best in an alkaline medium, which brings me to the point I wish to emphasize —the great duty of the dentist to his patient in furthering this action. When you insert a filling let one of the principal objects be to secure the best occlusion possible. I do not care whether you favor extending your fillings gingivally under the healthy gum margin or not, as this is not essential to the mastication of the food. See that the mouth is in a normal condition, and that there are no places for the lodgement of food, as when in the presence of these fermentation will take place and result in an acid condition which we know to be unfavorable to starch digestion. I heard Dr. Black state a few weeks ago that he had had a cavity in a lower molar which had not grown larger for the last twenty years. I do not think his digestion has been benefitted by the cavity being there, nor do I think he would recommend the leaving of such cavities in the mouths of his patients.

The extraction of teeth for artificial dentures is a much graver crime than the average dentist realizes, for it is a well-known fact that the physiological action of the saliva and mucous membrane is very different in a mouth wearing a denture from one with the natural teeth.

Discussion. *Dr. F. B. Noyes*, Chicago: I wish to enlarge upon the essayist's statements in regard to the relation of the cellular

elements which form the secretion of the saliva to the anatomical structures and to the blood. You will remember that he described the cells as obtaining their substances from the blood. If we think of these glands as being formed by a bending inward of the mucous membrane of the mouth, just as if the finger poked down the mucous membrane into the tissue below, we shall understand the matter correctly. This forms a sort of tube lined by epithelial cells, and as it is carried down into the tissue beneath it branches and rebranches and finally each branch ends in a bulbous enlargement called an alveolus, which is the working part of the gland. This sac is covered over on the outside by a fine network of capillary blood-vessels. The cells which form the wall of the sac are pyramidal, and in sections look like a piece of pie, and they have at the center a cavity leading into the duct.

Now these cells may be likened to filters. They stand between the blood-vessels on the outer side and the cavity of the excretory duct on the inner. They take up the substances from the blood on one side and work them over in the protoplasm of the cell, pouring them out as the secretion of that gland into the duct. Ninety-nine per cent of that secretion is water from the blood, but it also takes up salts, and the only essential characteristic product of the parotid and submaxillary glands. That substance is the only digestive element of the saliva, and is what converts starch into a form of sugar.

I believe that the progress of physiological thought in regard to the functions of saliva distinctly tends to enlarge upon its physical function, its lubricant property, and of late to diminish to a certain extent the emphasis heretofore put upon its digestive action. This last named differs greatly in various animals. In the dog there is little, there being much less ptyalin than in man, because a dog ordinarily does not eat starch. In the cow there is scarcely any, because she does not have to digest starch, but when we come to the animals which eat grain and other starchy foods we find the percentage of ptyalin increased. In spite of this, the tendency is to show that the greater part of starch digestion is accomplished by the pancreatic secretion which acts more powerfully upon starches than does ptyalin. However, we do not ordinarily allow the saliva to act as long as it can, and many stomach disorders are caused by starch being imperfectly converted in the mouth by the saliva. All

action on starches is stopped in the stomach, as the ptyalin does not act in an acid medium like the gastric juice. Digestion is stopped until the starch passes into the small intestine, where the reaction again becomes alkaline, but there is fermentative action upon the starch in the stomach which causes gastric dyspepsia.

The essayist stated that in bilious cases the bile or bile products were found in the saliva. This indicates that the ordinary means of elimination are not sufficient, and that the salivary glands, which act for the most part physiologically, are also called upon. The proportion of certain salts, especially some metallic ones, which are eliminated by these glands is considerable, and we are familiar with the fact that mercury and its salts act strongly upon the salivary glands, so that when the system is overloaded with mercury more is eliminated by them than by the kidneys. If I understand correctly the work of Dr. Michaels, he has been studying largely along this line and examining the saliva with reference to this eliminative action of the glands. Consequently, he insists that in disease the saliva should be examined just as much as the urine if we wish to ascertain what substances are being eliminated from the body. Cyanids and other salts are sometimes present and sometimes absent, and it was to these salts especially that Dr. Michaels referred as being of importance in the conditions which lead to or inhibit dental caries.

The uses and all conditions of the saliva are questions of the greatest importance to the dental profession, and more study should be given to them. By looking into the matter a little more closely we can often control the excessive flow of saliva which is so annoying to both patient and operator. Certain mental conditions tend to increase the flow, and these can usually be controlled. The importance of maintaining certain masticating areas, both in fillings and artificial dentures, cannot be too strongly emphasized. They are essential to secure the most complete conversion of starch in the mouth, and this should be done if we wish to obtain proper digestion and to avoid stomach disturbances.

Dr. C. R. Taylor, Streator: I have not heard pain mentioned as causing a flow of saliva, yet frequently the moment I cause a person pain there is an excessive flow, and sometimes there seems to be a reaction in which actual pain is produced by the undue outpouring of saliva. I have experienced that myself, having wakened in

the night with an intense pain around the salivary glands and an excessive flow of saliva. Now, would the pain experienced in mastication by individuals who have bad or decayed teeth cause the saliva to flow more freely than usual, and if so, would the excess affect the food? Again, if it is a fact that uncooked starch is not affected by the saliva, may it not be one of the main causes why savages are so nearly immune to dental caries, and also one of the reasons why we to-day are suffering so much from the disease, in that we are eating too much cooked starch?

Dr. J. J. Reed, Rockford: There was no reference made to the action of ptyalin on starch. Dalton says that it has no effect on raw starch in two hours time, but it attacks cooked starch almost immediately. Consequently, raw starch lodged in and around the teeth would not ferment, but the cooked product would be converted into a form of glucose which would be almost a perfect food for the bacteria of decay. As regards the cavity in Dr. Black's mouth, I think you will find that it is one where the walls are broken down so that it is self-cleansing. In this case it would be just as well unfilled. The only theory of immunity extant today is, that there is a property in saliva which dissolves the gelatinous placques, leaving the bacteria unprotected, so that they are washed away. Every mouth has the germs of decay in it, and if you take an immune tooth and drive a band on it, making an opportunity for food to lodge, caries will progress. Consequently, it resolves itself not into a question of some property of the saliva, but a matter of opportunity, so that we are perhaps going astray in some of our researches.

Dr. T. W. Brophy, Chicago: Dr. Michaels has made accurate diagnosis, formerly achieved only with great difficulty, comparatively easy, as he states that all known diseases may be diagnosed through an examination of the saliva. His work is certainly the most remarkable that has been accomplished during the last fifty years along this line. I wish to compliment the essayist on his paper and to urge him to pursue his studies, as this is a field with endless possibilities, yet it has been sadly neglected.

Dr. F. B. Noyes, Chicago: Under the microscope a starch grain is a wonderful thing, and is made up of a complicated cellulose wall, a wall of wood, which confines the starch in a very resistant manner. Fluids do not get at the starch at all unless heated almost to the boiling-point so as to soften the wooden wall.

Cooking of the grain is simply dissolving the wall so as to let the starch get into solution with the water. I believe that if uncooked starch had any part in preventing decay in the primitive man, it was due largely to the wall going over the teeth like a scouring medium.

Dr. J. E. Hinkins, Chicago: I met Dr. Michaels last year in Paris and he told me that my liver was out of order. He took a sample of my saliva, stating that he would examine it and tell me what was the matter, also give me something to remedy the trouble. He failed to do either, however, and I have not heard from him since. I appreciate his work, just as I do that of any investigator, but after conversing with him and carefully reviewing his paper and ideas, I fear he will never attain distinction in the line of physiological chemistry.

Dr. Dicus, closing discussion: I am afraid some of the audience did not listen closely enough, as I certainly spoke of cooked starch. Dr. Taylor's question about the physiological action of the saliva in patients wearing artificial dentures covers entirely too broad a subject to discuss here, but I should like to see some one write a good paper along that line. I cannot agree with Dr. Reed that the cavity in Dr. Black's tooth is self-cleansing, for no matter where it is starch will cling there and fermentation take place.

MICROBIOLOGY AND OFFICE CLINIC.

By G. D. Sitherwood, D.D.S., Bloomington, Ill Read Before the Illinois State Dental Society, at Rockford, May 14-17, 1901.

The germ theory of disease may be said to date back at least two hundred years, but it rested only on hypothesis until the latter part of the nineteenth century, as it was not possible until a considerable degree of perfection had been attained in the construction of the microscope, and repeated experiments of various kinds had taught great caution as to this explanation, that a sufficient number of scientific facts could be collected to furnish a base for the demonstration of what before had been only a theory.

The origin of life and of microorganisms has ever exercised the mind of man. "Does life originate spontaneously?" remained an unanswered question well along into the first half of the last century. Aristotle affirmed that "Every dry body becoming moist, and every moist body becoming dry, engenders animals." Virgil asserted

that bees originated in the carcass of a dead ox. Von Helmont supplied the prescription for producing the domestic mouse. In 1748 Father Needham, an Irish priest, declared in favor of spontaneous generation. His experiments were made in a modest way, but were so convincingly presented that he was elected a Fellow of of the Royal Society of London, and a little later one of the eight associates of the French Academy of Sciences. As late as 1859 Pouchee performed experiments by which he triumphantly demonstrated the process of spontaneous generation under circumstances that seemed to make error impossible. The spontaneous-generation controversy was finally settled in 1860 by Pasteur, who showed that the generally accepted idea that heat equal to the temperature of boiling water must destroy all living organisms was a mistaken one, and that especially in alkaline liquids a higher temperature was required to insure sterilization. The "chemical production of life" has been recently revived in a certain measure by Prof. Jacques Loeb of the University of California, who claims that he chemically fertilized the eggs of sea-urchins and hatched the eggs so fertilized. If true, however, it is a phenomenon of nature and nothing of permanent value is likely to develop from it. Pasteur in 1865 showed that the atmospheric organisms which resist the boiling temperature are productive bodies or spores which he described under the name of "corpuscles ovoides" or "corpuscles brillant." The spontaneous-generation controversy, however, stimulated thought and caused great improvements in the development of microbiology. The methods of research were changed by the use of a cotton air-filter, the sterilization of culture fluids by heat, the use of analine dyes as staining agents, and the introduction of solid culture media of Koch for obtaining pure culture.

While Leeuwenhoeck has been called "the father of microscopy" because he observed some of the larger species of bacteria with his magnifying-glasses in 1675, and Muller a century later made the attempt to define the characters of these minute organisms and classify them, we are much indebted to such men as Ehrenberg, who in 1838 described four kinds of filamentous bacteria under the general name of *vibrioniens*. He called them "filiform animals, distinctly or apparently polygastric, naked, without external organs, with the body uniform and united in chains or in filiform series, as a result of incomplete division." Sir Henry Holland advocated an animalcular

theory in 1839. Dujardin in 1841 also placed the vibrioniens of Ehrenberg among the infusoria, describing them as "filiform animals, extremely slender, without appreciable organization, and without visible locomotive organs." Dr. J. K. Mitchell, of Philadelphia, published a volume as early as 1847, in which he advocated the doctrine that malarial and epidemic fevers are produced by the introduction into the system of cryptogramic organisms. Linneaus, the great Swedish botanist, broached a similar theory. In 1853 Charles Robin suggested the relationship of Ehrenberg's vibrioniens with the germs *leptothrix*, which belong to the algae. Davaine in 1859 insisted that the vibrioniens were vegetable organisms nearly allied to the algae. This theory is sustained by the German botanist, Cohn, and is now generally accepted. About 1850 Rayner and Davaine, of France, discovered microscopic bodies in the blood of animals affected with anthrax. In 1857 Branell found the same rod-like bodies in the blood of men, horses and sheep dying of anthrax, also in the blood of diseased animals from one to ten days before death. Davaine in 1863 pronounced the rod-like bodies to be *bacteria*, and afterwards called them bacteridia, to distinguish them from the bacteria of putrefaction. The germ theory of disease may therefore be said to have commenced as a science with the discovery of microorganisms in the blood of diseased animals and men.

Microorganisms are small microscopic bodies having various forms, sometimes existing in innumerable quantities in blood and urine, and are often found in vast numbers in the blood of animals having certain diseases, both before and after death. The standard of measurement used at present is the micromillimeter, or the one-thousandth part of a millimeter, represented by the Greek letter μ. One micromillimeter is equal to about one twenty-five thousandth of an inch. The spherical micrococci differ greatly in size according to their grouping, linary division or association. The smallest may measure no more than 0 1 μ, while some of the larger species are from one to two μ in diameter. It would thus take a chain of one thousand of the largest micrococci, each having a diameter of one μ, to measure one twenty-fifth of an inch.

The nomenclature now generally in use among bacteriologists corresponds most nearly to that of Baumgarten. The spherical bacteria are called cocci or micrococci; the rod-shaped, bacilli, and the spiral, spirilla. Among the spherical bacteria are numerous

well known species between which the most expert microscopist could not differentiate, because the stained preparations look too much alike. It was not suspected that there were four or more distinct species of microbes in the pus of acute abscesses until Rosenbach and Pâsset demonstrated that such was the case, and showed that not only was the streptococcus distinct, but that among the cocci not associated in chains there were three species which are to be distinguished from each other by their color—milk-white, lemon-yellow and golden-yellow—when grown on the surface of a solid culture medium.

Microorganisms which form pigment are called chromogenic; those which produce fermentation, zymogenic; those which give rise to disease processes in man or the lower animals, pathogenic. Some of the chromogenes and zymogenes are also pathogenes. Microorganisms are also spoken of in relation to the surroundings favorable for their development. Saprophytes are such as exist independently of a living being, and obtain their supply of nutriment from dead animal or vegetable material and from water containing organic matter in solution. The *strict parasites* on the other hand depend upon a living body in which to multiply, sometimes without apparent injury to the animal, but more frequently they are harmful invaders. A microorganism which can survive under either environment is designated a facultative parasite. Thus the leprosy bacillus, which is only found in leprous tissues, is a strict parasite; while the typhoid bacillus and the cholera spirillum are facultative, as they are capable of maintaining for a time at least an independent existence outside the living animal body.

It may be well to remark here that according to Dr. Klein of Germany, who has made the experiments, the bacillus prodigiosus staphylococcus aureus, bacillus of cholera, Eberth's bacillus, that of typhoid, and the plague germ, are not found living in dead bodies after from eighteen to twenty-eight days. After six weeks no culture develops. The bacillus of tuberculosis does not survive the animal it has killed; although found in the organs no cultures can be made of it, and Klein never succeeded in producing tuberlosis by injections of bacilli found in dead bodies. The tubercle bacillus taken from a living body may be cultivated in artificial media, it is therefore supposed by some modern experimenters that some time far in the past it was able to lead an independent or

saprophytic existence, and that the great destruction of human life resulting from its parasitic invasion of the human body was not designed when it was created.

Again, we have aerobic and anaerobic species of bacteria, the microbes that will grow only when freely supplied with oxygen, and those which absolutely refuse to grow. Facultative anaerobics are those species that grow either with or without oxygen. Then again there are liquefying and non-liquefying bacteria; others are defined as motile and non-motile. Hueppe has a classification based upon the mode of reproduction, in which he makes two tribes, "*endospores*" and "*arthrospores*," but by many this is considered impractical. No attempt will be made to give the character of these different classes. The nitrogenous waste products can only be alluded to, as the pathogenic power of the microorganisms which cause various infectious diseases in man and the lower animals has been shown by some experimenters to result from the production of toxic ptomaines or toxalbumens.

The bioplasmic germ theory of Dr. Beale has not received the favorable attention it deserves. In his work called "Disease Germs" he says—"Vegetable germs are found in the tissues during life in a state of health—on the mucous membrane of the mouth; they invade the tissues and the intestines, but the living germinal matter of the tissues is probably perfectly free from vegetable germs. * * * In very many different forms of disease these bacteria germs, and probably those of many fungi, are to be discovered in the fluids of the body, but the evidence yet adduced does not establish any connection between the germs and the morbid process. * * * Germs, apparently of the same nature as those of cholera, are invariably to be found in the old epithelial cells in the mouths of healthy persons, and not rarely in those from many other surfaces. In the intestinal canal in various slight derangements they are common enough, so we cannot but conclude that their presence is due rather to alterations in the fluids consequent upon morbid changes than that they themselves are the cause of disease. They follow the morbid changes instead of preceding them." Therefore it is his opinion that microbes grow and multiply whenever a condition in the animal system favors the production of a pabulum suitable for their development. He further says, "Minute vegetable germs are everywhere, though they may easily escape observation.

If, however, the pabulum adapted for them be present and the conditions favorable to their development exist, they soon grow and multiply and abundant evidence is afforded of their presence." He then explains the nature of disease germs thus: "I consider it to be almost certain that the material of which these particles are composed has the power of forming matter like itself from the pabulum around it, which differs from it in properties and composition. Such living germs may pass from the organism on which they grow to another, and will grow and multiply there if they meet with the proper pabulum. * * * Upon the whole, then, I venture to conclude that the millions of contagious particles produced in the organism in an eminently contagious disease are all the direct descendants of the very few, or perhaps even the single particle first introduced; just as the millions of bacteria and fungi developed in the course of a few hours in certain decomposing organic matter may have been produced from one or at most from a few particles." Dr. Beale says that fungoid matter is found within bioplasmic cells.

The researches that have been made in reference to microorganisms have been most extensive and of far reaching import, about a thousand having now been classified and described by numerous authors. In the human mouth myriads of these germs are constantly present, and under favorable circumstances they are responsible for most of the diseases of the teeth and contiguous parts, and also give rise to other local and general disturbances of the most serious character. Dr. Miller in "Microorganisms of the Human Mouth" makes this statement: "Anyone, therefore, who continues the search of the modern culture-methods for a long period of time will continually meet with new kinds, until at last all cultivatable microorganisms, whose germs occur in the air, in food and drink, will have been found in the oral cavity." By 1890 he had been able to isolate more than one hundred different kinds of bacteria from the juices and deposits in the mouth. Of those which occur in almost every mouth he names six as *mouth bacteria proper:* 1. Leptothrix innominata. 2. Bacillus buccalis. 3. Leptothrix buccalis maxima. 4. Jodococcus vaginatus. 5. Spirillum sputigenum. 6. Spirochacte dentium (denticola). To this list Goadby and Washbourne add streptococcus brevis and the leptothrix racemosa of Vicentini, which Williams regards as the parent organism

of the mouth, from which an enormous number of spores or fructification heads are being constantly shed into the oral cavity and classified as permanent species. Whether the leptothrix racemosa of Vicentini is the same as Miller's leptothrix innominata or not, it more firmly establishes the fact that microorganisms constitute the sole direct or indirect exciting cause of dental caries.

Every dentist holds private clinics in his office daily. The old question is asked—What makes the teeth decay? If you reply, the microbes, and explain fully to parents and children the necessity of having all cavities filled, all the rough surfaces made smooth, how teeth should be cleansed with pick, floss-silk and brush; also the necessity of some germicide as a mouth-wash, and the value of tooth-powder, much has been accomplished. However, we are not discussing these things, but how to impress upon the patient the importance of their thorough use. Ten commandments might be formulated for a Jew, but for Jew or Christian the expediency of any set of rules is very doubtful. Facts should be taught in a clinical way, and principles set forth in such a manner that each individual may be free to act according to his own judgment as to the best method of insuring the thorough cleansing of the teeth. In one of Kipling's stories he says, "You cannot explain things to the Oriental, you must show." If we do not have Orientals in office clinics we have many skeptics who never saw a microbe taken from the human mouth. Will they be convinced if we show them one or a few thousand by looking through the object-glass of the microscope? If not the microbe, then a picture of same, as some writers on this subject so beautifully illustrate their articles. Dentists and physicians who are using the microscope in bacterial researches should give the old people and the children who come to the office an opportunity as often as occasion will permit to look through the microscope at some of the intruders taken from the oral cavity, which break down and destroy the best of tooth structure in their ceaseless efforts.

The office, the chair, the dentist himself, and everything pertaining to the office should be in such condition that they say even to the casual visitor—"*No microbes here!*" It is what the patient sees and what the dentist does that teaches the real importance of many things. Just what the professional man is in his daily life, and in all that goes to make up that life—in thought and action,

even to the smallest details, out of the office as well as in the office; just in the same proportion will these clinics enlighten and benefit his little world. In almost every instance the dental surgeon holds the exact place in the estimation of a generous public opinion to which he is justly entitled.

Discussion. *Dr. F. B. Noyes*, Chicago: Dr. Sitherwood referred to the work of Dr. Beale. The latter is apparently opposed to the prominence which has been given to the germ theory or to the infectious and contagious nature of certain diseases. He believes that the presence of microorganisms is not the cause of the disease but the result of it; that they do not grow in the tissues nor in the body except when the condition of the latter has become favorable for them. While all this appears to be directly opposed to current lines of thought, I believe future developments will show that many present ideas are merely supplemental. We know, for instance, that in tuberculosis the diseased condition of the body is caused by the action of the tubercle bacilli, but the introduction of these germs into a person's system does not always lead to the disease. Now, Dr. Beale has emphasized the conditions of the body which make possible in it the life of these disease-producing germs. These factors have been to a certain extent neglected in the past, because we have been entirely occupied with the action of the microorganisms after they begin to work.

PICRIC ACID AS A SURGICAL AND DERMATOLOGICAL DRESSING.—Thiery in *Rev. de Ther. Med. Chir.*, remarks upon the antiseptic, analgesic and keratoplastic properties of picric acid in the treatment of burns. Surgeons and dermatologists, however, soon learned the use of this topic in many other instances, the main principle of these various applications being the marked keratogenetic action of the drug as against the powerful keratolytic agency of most antiseptics. Aubert, Brousse, Gaucker, etc., use it in the treatment of eczema. Thiery and Calvelli have demonstrated its usefulness in erysipelas and herpes zoster. The author insists that dermatologists will secure remarkable results by the suppression of two decidedly antikeratogenetic procedures—i. e., the use of ointments and of moist dressings—and observes that far better results can be secured in most instances by the employment of a saturated solution of picric acid in ether applied with a camel's-hair brush. Pasteau, Desnos, Scatolari and Vigneron have successfully treated gonorrhea with picric acid in local applications; while others report remarkable results in blepharitis, purulent otitis, lupus, phagedenic chancres, and chronic pharyngitis. Thiery further suggests the possible usefulness of picric acid as a topic in the various inflammatory conditions of mucous membranes.—*Med Age.*

Digests.

ADJUSTING DAM CLAMPS ON CONICALLY SHAPED TEETH. By C. E. Bellchamber, D.M.D. The adjusting of the rubber-dam on some teeth is a vexatious undertaking, especially on molars. The teeth that cause operators most of the trouble are the class styled "conical," with a short crown. The great difficulty seems to be to get the dam-clamp to remain in its proper position and not work up on the tooth or possibly slip off altogether. So far there seems to be no clamp made that exactly serves the purpose without giving trouble to the operator. Some of the clamps now made for such cases grasp the tooth too far root-wise, causing unnecessary pain. Take a tooth in which the crown is short and the tooth much larger in circumference at the free margin of the gum than at the occlusal surface, the buccal and lingual surfaces inclining sharply towards each other; such a tooth has a tendency to displace any ordinary clamp when placed upon it.

A method found to work nicely in such cases is the following: In order to overcome this difficulty and still use an ordinary clamp, have a mixture of shellac and alcohol. Then place either a napkin or some of the absorbent preparations in the mouth and around the tooth, drying it as thoroughly as possible. Then apply some of this shellac solution to both buccal and lingual surfaces of the tooth, allowing it to dry. After this becomes dry saturate a piece of spunk (about twice the size of a pin-head) in some chloro-percha and place it upon the surface previously shellacked in the desired position. In a few moments the chloroform will evaporate, causing the spunk to adhere sufficiently to maintain its position. After this the clamp and dam can be passed over the tooth and two little spuds to the desired position without the clamp working up on the tooth. It is simple but a very effectual remedy.—*Brief, July, 1901.*

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TIT FOR TAT—A FABLE BY AN OFFICE BOY. One Day a Man cum into the Bosses offis, and says he, mister, I am A Stranger which cum a hundred an' 50 miles to Get some Teeth filled; can you do it right Away? the Boss he Thot a Minit and says he, No I'm afeard Not; I've got A all-Day appointment With

judge perkinsis Wife. So the Man went of, and after a While the Boss he Got tired Waiting for miss perkins to cum, so he went and cleaned out the Seller, and Shuveled Cole all day. Late that Evenin Dr. Jones cum in Smokin a 15 sent sigar, and he Slapt the Boss on the Shoulder, and says he, hello, sanders, you dun me A good turn When you Sent that Stranger over To my Offis this a. m. I Dun Forty-4 dolers an' 50c. worth Spot Cash for him. The Boss looked Kind o' dazed for a Minit, and after a Bit he remarked That he be Dam if he Ever had A bit of Luck. One day About a Weak later miss perkins cum sailing in Just as Me and the boss was tryin' to put a Clamp on a wisdom Tooth in a Sucker's mouth, and Says she, doctor, I'm Ol Reddy; Kin you Wait on me rite Away? I Seen he was Mad, but he Smild kind o' Pleasant, an' says He, cum in After diner an' Yu'll find The chair unoccupied. She Went of, Lookin' like she Thot that Wasn't the way She was Expectin' to be Treated. After diner she Cum in an' says kind o' commandin': Wher's The dentist? an' says I he's gone Fishin'. Gone Fishin'! says she turnin' red. Yes, says I; he'll be back 'bout crismus. Says she, you Tell him i've Gone to Another dentist wot's More puntchul. He'll never Do no more Work for Our family. So There.—*Med. and Dent. Jour.*

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EARLY DECAY OF TEETH. By J. Sim Wallace, D.Sc., M.D., L.D.S. Some time ago you kindly published a series of articles on "The Etiology of Dental Caries," in which I put forward the view that "the cause of the prevalence of dental caries is that the natural food stuffs are to a large extent ridded of their accompanying fibrous parts, and prepared and consumed in a manner which renders them liable to lodge and undergo acid fermentation in the mouth; while from the same cause and the induced conditions the microorganisms of the mouth lodge and multiply, and augment the rapidity and intensity of the acid fermentation." It was after what to my mind was proof positive that I wrote the articles, and fortunately the arguments then brought forward have convinced many and partially convinced others. I was persuaded, however, that no amount of argument would convince many who believed in the hereditary and constitutional nature of the disease, nor those who were confirmed in the belief that the teeth of civilized man had become degenerate.

If the theory I put forward were true, it occurred to me that the teeth of many of the lower animals might probably be no more immune to caries than are the teeth of men. I came to the conclusion that the freedom was due almost solely to dietetic causes. In order to test this I bought a monkey and tried to put it on a diet from which all coarse and fibrous matter had been removed, such as fine biscuits, toast, bread and milk, chocolate, cheese, meat juice, etc. At first I had provided the monkey with a bed of hay, and after it had satisfied itself with biscuits and milk it immediately commenced chewing the hay. This, of course, spoiled the experiment, so I removed the hay, but as the weather was cold I supplied the monkey with a little box lined with cork. Unfortunately it took to chewing the cork between meals. I next removed the cork and box, as I thought it would be better to let it sleep on the bare floor of the cage than have it chewing fibrous material for a considerable part of the day. Still, however, it did not understand the nature of my experiment, and persisted in nibbling off little pieces of wood from the sides of the wooden cage and running about with them in its mouth. I then rubbed the cage with quinine at all places which were accessible to the teeth or hands of the monkey, and it gradually gave up the habit of chewing these little pieces of wood. I mention these facts but to show how this and I presume other monkeys preserve their so-called "immunity" to dental caries.

The diet which the monkey received from this time onwards consisted almost wholly of biscuits, toast, bread and milk, and milk. It also had frequently a little treacle (one pound in all during about six months.) Occasionally it had milk pudding, and about a dozen times potatoes and milk; it had also a little chocolate, three ounces in all, and about thirty lumps of loaf sugar.

At the end of the first four months I examined the teeth carefully, but although there seemed to be slight indications of caries on the symphysial side of the first left lower molar, I thought it better to wait for more positive signs, and so did not trouble to examine the teeth for six months. On this second examination I found in the two upper first molars (which were the hindmost teeth in this monkey's head, as the animal was young and the other molars had not yet erupted) tiny discolored crevices between the anterior and posterior internal cusps, which seemed very much like caries. I extracted these two upper molar teeth and ground them down in

order to see the suspicious spots under the microscope, with the following results: Upper right molar. The crevice was found to be more than half the depth of the enamel, and around the deepest part of the crevice the enamel to the naked eye showed a chalky appearance. The margin of the crevice appeared stained brownish yellow under the microscope. From the bottom of the crevice there descended nearly to the dentin a strand of apparently disintegrating enamel. The dentin beneath this enamel was translucent, and translucency penetrating the dentin more than half-way to the pulp. The edges of the crevice were somewhat rough and cracks penetrated it.

A few days later, after the animal died, I examined the left lower molar. It showed on section under the microscope the enamel completely removed at one spot down to the dentin. The dentinal tubules immediately below the denuded part were swollen and granular, and some apparently filled with microorganisms. I may mention that a transparent cone of dentin reached from the disintegrated enamel to the pulp, when the section was examined before mounting in Canada balsam. Both of these teeth therefore presented appearances at least strongly simulating incipient dental caries. The upper left molar, though discolored in the crevice, showed no signs of caries.

It will be seen that the caries had not extended very far, but it must be remembered that the animal started with a set of teeth which were very actively used, so regular, so well polished, so small, and so protected by the gum coming up over the enamel, that I doubted whether I should see caries in its teeth at all unless it lived a very considerable time. I may state that it seemed in my opinion next to impossible for almost any teeth in this monkey's head to decay, as the natural fissures—for example, in the premolars—had been completely worn out, and a beautifully polished smooth surface was left on which food could hardly by any possibility lodge, and as I have just mentioned, the gums overlapped the enamel and came up between the teeth in a manner which seemed very perfectly adapted for preventing caries. I hoped for recession of the gums to take place under the diet, or that the more posterior molars should on coming into position be more liable to lodge food. Fortunately the crevices in the first molars were sufficient, and if the amount of caries observed was brought about in, say nine months,

what sort of state would these molars be in at the end of five years? I suppose pretty much the same state as are the first molars of children who are fed on the most "approved" principles, five years after their eruption.

It may be asked why I did not let the experiment go on longer before writing about it. Unfortunately it came to a sudden end on account of a fire which suffocated the monkey. Still I think the nine months have just been sufficient. Perhaps some other investigator will be more fortunate and continue the experiment for four or five years as ought to have been done.

The liability to caries therefore appears to be almost solely due to the fact that the foodstuffs are refined and administered in a form which is very much more liable to lodge in the natural crevices of the teeth, and there is practically no need for the assumption that the liability to caries has been brought about by any hereditary degeneration of the teeth, or by any molecular structural alteration due to defective nutrition of the teeth, or by any supposed vitiation of the buccal secretions, or by any constitutional states of the system brought about by indigestion, or by any other of the multitudinous suppositions which have been advanced from time to time.

I have advanced arguments elsewhere, not only from my own observations, but from the accumulated mass of facts which have been heaped up for years, unfortunately, however, arguments which necessarily involve close following and an abandonment of many current prejudices do not convince every one. Very many of the same facts have in other theories been continually misinterpreted, mainly, I believe, from the persistent habit of looking to the teeth and not to the food for the explanation, and from the almost universal belief that the disease is inherited. If it is supposed that the disease is inherited, then of course the causes which lead up to it would require to be sought for through the constitution. Hence has resulted the fact that some recent observers, having seen the futility (after chemical and microscopical examination of the teeth) of seeking the cause of susceptibility to caries in the teeth themselves, have found it necessary to seek it through the oral secretions.

I endeavored to ensure that the food should be in no way deficient in nutritive value lest it might be said that the teeth became predisposed or less resistant to caries through defective nutrition. It should also be noted that the food was of such a quality that the

jaws were required to be exercised, e. g., biscuits, toast, loaf sugar, so that if it be said that "the pressure brought to bear upon the teeth by mastication causes a more lively circulation in the periosteum and in the pulp, thereby inducing an increased deposit of lime salts or a more complete calcification," (Miller) then this method of securing immunity was not disregarded. And I think it could not be said that the soft quality of the food this animal had previously consumed had brought about "a soft porous dentin substance." (Miller.)

I mention this, as it is important to differentiate between the dietetic theories which trace the predisposition through the supposed nutritional changes in the teeth and the theory which I put forward tracing the prevalence of caries to the relative lodgability of the foodstuffs.—*Jour. Brit. Dent. Assn. June 1901.*

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MR. DOOLEY ON THE PRACTICE OF MEDICINE.—"What's Christyan Science?" asked Mr. Hennessy.

"'Tis wan way iv gettin' th' money," said Mr. Dooley.

"But what's it like?" asked Mr. Hennessy.

"Well," said Mr. Dooley, "Ye have something th' matther with ye. Ye have a leg cut off!"

"Th' Lord save us," exclaimed Mr. Hennessy.

"That is, ye think ye have," Mr. Dooley went on. "Ye think ye have a leg cut off. Ye see it goin' an' says ye to ye-ersilf: 'More expinse.' A wooden leg.' Ye think ye've lost it. But ye're wrong. Ye're well as iver ye was. Both legs is attached to ye, on'y ye don't know it. Ye call up a christyan scientist or ye're wife does. Not manny men is christyan scientists, but near all women is, in wan way or another. Ye're wife calls up a christyan scientist, an' says she: 'Me husband thinks he's lost a leg,' she says. 'Nonsense,' says th' christyan scientist, she says, f'r she's a woman, too. 'Nonsense,' says she. 'No man iver lost a leg,' she says. 'Well, 'tis sthrange,' says the wife. 'He's mislaid it thin,' she says, 'f'r he hasn't got it,' she says. 'He on'y thinks he's lost it,' says th' christyan scientist. 'Lave him think it on again,' she says. 'Lave him raymimber,' she says, 'they'se no such thing in th' wurruld,' she says, 'as pain an' injury,' she says. 'Lave him to put his mind hard to it,' she says, 'an' I'll put mine,' she says, 'an' we'll all put our minds to it, an' 'twill be all r-right,' she says. So she thinks

an' th' wife thinks an' ye think th' best ye know how, an' afther awhile a leg comes peepin' out with a complete set iv tootsies, an' be th' time th' last' thought is expinded, ye have a set iv as well-matched gambs as ye iver wore to a picnic. But ye mustn't stop thinkin' or ye'er wife or th' christyan scientist. If wan iv ye laves go th' rope, th' leg 'll get discouraged an quit growin'. Manny a man's sprouted a limb on'y to have it stop between th' ankle an' th' shin because th' scientist was called away to see what ailed th' baby."

"Sure, 'tis all foolishness," said Mr. Hennessy.

"Well, sir, who can tell?" said Mr. Dooley. 'If it wasn't f'r medical progress, I'd be sure th' christyan scientists was wrong. But th' doctor who attinded me whin I was young 'd be thought as loonatical if he was alive to-day, as th' mos' christyan scientist that iver rayjooced a swellin' over a long distance tillyphone. He inthrajooced near th' whole parish into this life iv sin an' sorrow, he give us calomel with a shovel, bled us like a polis captain, an' niver thought anny medicine was good if it didn't choke ye goin' down. I can see him now as he come up dhriven' ol' gray an' yellow horse in a buggy. He had whiskers that he cud tie in a knot round his waist, an' him an' th' priest was th' on'y two men in th' neighborhood that carried a goold watch. He used to say 'twas th' healthiest parish in th' wurruld, barrin hangins an' thransportations an' thim come in Father Hickey's province. Ivrybody thought he was a gr-eat man but they wudden't lave him threat a spavin in these days. He was catch-as-catch-can n' he'd tackle annything fr'm pneumony iv th' lungs to premachure baldness. He'd niver heerd iv mickrobes an' nather did I till a few years ago when I was tol' they was a kind iv animals or bugs that crawled around in ye like spiders. I see pitchers iv thim in th' pa-apers with eyes like poached eggs till I dhreamed wan night I was a hayloft full iv bats. Thin th' dock down th' sthreet set me r-right. He says th' mickrobes is a vigitable an' ivry man is like a conservatory full iv millyons iv these potted plants. Some ar-re good f'r ye an' some ar're bad. Whin th' chube roses an' geranyums is flourishin' an' liftin' their dainty petals to th' sun, ye're healthy, but whin th' other flower gets th' best iv these nosegays, 'tis time to call in a doctor. Th' doctor is a kind iv gardiner f'r ye. 'Tis his business f'r to encourage th' good mickrobes, makin' two pansies grow where wan grew befure an' to hoe out th' Canajeen thistle an' milk weed.

"Well, that sounds all right, an' I sind f'r a doctor. 'Dock,' says I, 'me vilets ar-re thinnin' out, an' I feel as though I was full iv sage brush,' I say. Th' dock puts a glass chube in me mouth and says, 'Don't bite it.' 'D'ye think I'm a glass eater?' says I, talkin' through me teeth like a Kerry lawyer. 'What's it f'r?' I says. 'To take ye're timprachoor,' says he. While I have th' chube in me mouth he jabs me thumb with a needle an' laves th' room. He comes back about th' time I'm r-ready to sthrangle an' removes th' chube. 'How high does she spout?' says I. 'Ninety-nine,' says he. 'Good hivens,' says I. 'Don't come near me, dock, or ye'll be sun sthruck,' I says. 'I've just examined ye'er blood,' he says. 'Ye're full iv weeds,' he says. Be that time I'm scared to death, an' I say a few prayers, whin he fixes a hose to me chest an' begins listenin.' 'Annything goin' on inside?' says I. ''Tis ye'er heart,' says he. 'Glory be,' says I. 'What's th' matther with that ol' ingine?' says I. 'I cud tell ye,' he says, 'but I'll have to call in Dock Vinthricle, th' specialist,' he says. 'I oughtn't be lookin' at ye'er heart at all,' he says. 'I niver larned below th' chin an' I'd be fired be th' union if they knew I was wurrukin' on th' heart.' he says. So he sinds f'r Dock Vinthricle an' th' dock climbs me chest an' lishtens an' thin he says: 'They'se something th' matther with his lungs, too,' he says. 'At times they're full iv air, an' again,' he says, 'they ain't,' he says. 'Sind f'r Bellows,' he says. Bellows comes an' pounds me as though I was a roof he was shinglin' an' havin' accidentally hit me below th' belt, he sinds f'r Dock Laporattemy. The dock sticks his finger into me as far as th' knuckle. 'What's that f'r,' says I. 'That's O'Hannigan's point,' he says. 'I don't see it,' says I. 'O'Hannigan must have had a fine sinse iv humor.' 'Did it hurt,' says he. 'Not,' says I, 'as much as though ye'd used an awl,' says I, 'or a chisel,' I says, 'but,' I says, 'it didn't tickle.'

"He shakes his head an' goes out iv th' room with th' others an' they talk it over at tin dollars a minyit while I'm layin' there at two dollars a day—docked. Whin they come back wan iv thim says: 'This here is a mos' intherestin' case an' we must have the whole class take a look into it,' he says. It means me, Hinnissy. 'Dock,' he says, 'ye will remove it's brain. Vinthricle, ye will have it's heart, an' Bellows, ye will take it's lungs. As f'r me,' he says, 'I will add wan more vermiform appendix to me belt,' he

says. ''Tis sthrange how our foolish predecessors,' says he, 'niver got onto the dangers iv' th' vermiform appendix,' he says. 'I have no doubt that that's what kilt Methusalem,' he says. So they mark out their wurruk on me with a piece iv red chalk an' if I get well, I'll look like a rag carpet. Sometimes they lave things in ye, Hinnissy. I knowed a man wanst, Moriarty was his name—Tim Moriarty, an' he had to be hem-stitched hurriedly because they was goin' to be a ball game that day an' they locked up in him two sponges, a saw, an ice pick, a goold watch an' a pair iv curlin' irons belongin' to one iv th' nurses. He tol' me he didn't feel well, but he didn't think anything iv it tell he noticed that he jingled when he walked.

That's what they do with ye nowadays, Hinnessy. Ivry time I go into Dock Cassidy's office, he gives me a look that makes me wisht I'd wore a suit iv chain armor. His eyes seem to say, 'Can I come in?' Between th' christyan scientists an him 'tis a question iv whether ye want to be threated like a loonytic or like a can iv presarved vigitables. Father Kelly says th' styles iv medicine changes like th' styles iv hats. Whin he was a boy, they give ye quinin f'r whativer ailed ye, an' now they give ye strychnin an' nex' year they'll be givin' ye proosic acid, maybe. He says they're findin' new things th' matther with ye ivry day, an' ol' things that have to be taken out, ontil th' time is comin, whin not more thin half iv us'll be rale an' th' rest'll be rubber. He says they ought to enforce th' law iv assault with a deadly weepin' agin th' doctors. He says that if they knew less about pizin an' more about gruel an' opened fewer patients an' more windows, they'd not be so manny christyan scientists. He says th' diff'rence between christyan scientists an' doctors is that christyan scientists thinks they'se no such thing as disease an' doctors thinks there ain't annything else. An' there ye ar-re."

"What do ye think about it?" asked Mr. Hennessy.

"I think," said Mr. Dooley, "that if th' christyan scientists had some science an' th' doctors more christyanity, it wouldn't make anny diff'rence which ye called in—if ye had a good nurse."—*Buffalo News.*

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DENTAL NEURASTHENIA. By W. H. Whitslar, D.D.S., Cleveland. Read before the Tri-State Dental Meeting, at Indianapo-

lis, June, 1901. Neurasthenia is found more frequently among men than women, but in dental practice it seems more common among women. Single men and married women are most afflicted, and the age is between eighteen and fifty-five years. It is occasionally found in children, but is often unrecognized among them. All persons predisposed to neurasthenia are affected by climate. Dryness of atmosphere predisposes to nervous excitability which is an expression of neurasthenia. Dryness causes an absorption of the natural fluids of the body, and as dry air is a poor conductor of electricity the body becomes overcharged, thus the nervous system becomes more susceptible to internal or external excitation. Extremes of cold and heat cause nervousness. Those who by hereditary or other influences have become neurotics and degenerates, or both, are most susceptible to loss of neuricity. Men and women of genius are susceptible to neurasthenia, because as a rule they are deficient both as to mental and physical capacity in some direction. Therefore heredity plays its part in the transmission of those influences which weaken the natural resiliency of the nervous system.

From the numerous definitions I assume that neurasthenia is not exactly a disease of itself but an incoordinate action of neurility wherein it may be made the basis of many functional diseases. These definitions also indicate that two forces are concerned in neurasthenia. Let the one be called *neurosis* q. v., and the other *psychosis*. Neurasthenia affects the whole system. Two principal symptoms of neurasthenia are *nerve weakness* and *nerve irritability*. In neurasthenia the special senses are not always affected, but may become exciting causes of the disorder, for instance, we perceive congenital defects of vision which later cause change of habits and the work of children.

Neurasthenia in children is often ascribed to "overwork" when it finds its etiology in astigmatism, muscular insufficiency, myopia, or hypermetropia. The far-sighted (hypermetropic) child neglects books and cares for out-of-door sports; the near-sighted (myopic) child does not care to play out of doors and reads more than is best, hence we notice children of the latter class acquiring sedentary habits and becoming nervous and irritable. They lose their power of coordination and neurasthenia is produced long before the cause is recognized. In this class of dental patients we find aggravated conditions which interfere with the proper performance of the care

of the teeth. The same results may be said of those affected with muscular insufficiency and hypermetropia. An eminent oculist informed me that he observed more of the above classes affected with neurasthenia than those afflicted with myopia, because the latter give up to their conditions more readily.

A large proportion of people use their brains in the struggle for existence. Brain cells are much like muscle, if overworked exhaustion is produced. C. F. Hodge gives some remarkable experiments which were made upon animals before and after fatigue. It was found that the nucleus of the cell decreases in size and becomes irregular in outline. The protoplasm of the cell shrinks and spinal ganglia are vacuolated. The cell-capsule when present has a decrease in size of its neucli. Lastly nerve cells recover slowly if allowed to rest for a sufficient time. From these conclusions we infer that from the loss of cell substance there must be much waste product circulating in the blood. The excessive material has a toxic action and thus paralyzes the system. In other words, there is in this a suggestion of the autointoxication of the tissues due to indigestion, as related by Talbot, who states that autointoxication from indigestion involves the whole mucous membrane of the alimentary canal and especially the mouth, in which there is a change in the secretions and thickening of the mucous membrane. It is stated by Dercum that there is a relation between gout and neurasthenia, and that neurasthenics often have uric acid in great excess.

It is reasonable to suppose that pyorrhea alveolaris is an example of an overworked, exhausted, peridental membrane whose tissues are intoxicated with the excessive material in the blood currents and intercellular tissue. It is a neurotrophia or impairment of the nutrition of the nerves. Exhaustion of the peridental membrane when it occurs is often confined to one or more teeth, and is the result first, of some irritation, and second, an attempt to relieve the uneasiness produced by the irritation from the pressure against the occluding tooth. With pressure comes exhaustion, "neurasthenia localis" which eventually terminates in the graver tissue destruction. From the presence in the blood of toxic substances as an outcome of profound neurasthenia, from whatever cause primarily, it is but just to argue that all tissues of the mouth which are subject to blood currents may suffer from the toxic condition. The cacochymic state undoubtedly produces neurasthenic conditions

surrounding the teeth as well as the recrementitious fluids of the mouth. Further it is my thought that stigmatism of the enamel as shown by the so-called atrophied spots and pits is the relic of trophoneurosis, an impairment of nutrition which may be due to exhaustion.

"Anesthesia does not exist in neurasthenia" (Dercum) hence we may expect undue sensitivity of the teeth and tissues of the mouth. The dental pulp readily responds to external stimulation and wrathfully expresses its anger in painful elements. As neurasthenia is not a constructive disease but a symptom of exhausted energies, the pulp of the tooth, if subjected to continued irritation, dies unless the fortifications of secondary dentin and pulp nodules are formed. The pulp is easily irritated in neurasthenics and exquisite sensitivity of the dentin is often noticed. Bridgework dependent upon distant anchorages causes strain of the peridental membranes, producing exhaustion of the cellular elements and eventually their destruction. With this the alveolar processes give way, and being no longer supported in its place the bridge is lost. Worriment concerning dental tissues conduces to neurasthenic conditions.

Neurasthenia is one of the symptoms of decay, or expressed otherwise, decay of teeth is the result of those conditions which predispose to decay and which are concerned in the biochemism of the tissues. Ranney, the neurologist, says: "Premature decay of the teeth has been brought forward as one of the most striking evidences of the steady increase of the constitutional impairment which has followed our present methods of living." Such is this condition that neurologists generally recognize decay of the teeth as a sign of depression of the nervous system. Dr. Michaels refers to saliva as an indicator of the decay of the teeth, also of the diathetic and organoleptic conditions of the body. He declares that the tissues and secretions depend upon the blood plasma; a dyscrasic condition modifies the forces of the economy and produces local or general manifestations taking place alternately and successionally. Abnormal vital processes end in two ways, hypoacidity and hyperacidity.

In hypoacidity there is a vital overactivity resulting in the contagious diathesis, as in tuberculosis, syphilis, etc. In consequence of this state it is evident that nerve exhaustion is easily acquired. Dr. Michaels' experiments show, too, that dental decay is more

prevalent in this state; hypoacidity, and an indicator of the same is the relative proportion of ammonia being greater in the saliva than the sulpho-cyanids. A very important item was that the activity of dental decay is modified by the diathetic period. Now, in hyperacidity we find a decrease of vital activity, but an increase of acidity of the blood, and an accumulation of acid products which in their turn poison the system.

The conclusion to be derived from a study of these conditions is that there may come a neurasthenic state either from hypoacidity (over-activity) or hyperacidity in which waste products accumulate; that biochemistry of tissues is a part of life's processes, and diseased conditions of every tissue are dependent upon them.

Treatment. In the treatment of neurasthenia there are two elements to consider, patient and dentist. In both we sometimes find the same conditions, i. e., worry, fear, exhaustion from temperature, deficient respiration and psychic disturbances. The dentist is exhausted by continued physical labor and anxiety for the care of those whose nervous system are intractable by common measures. He is compelled to reduce psychic disturbances by putting himself *en rapport* with the patient. This signifies a depletion of his own neurodynamia. The first principle of this treatment is to secure the *passivity* of the patient. Rest is the *sine qua non* treatment for neurasthenia. Upon this fact Dr. Weir Mitchell based his famous treatment of neurasthenia known as the "Rest Cure." In the performance of dental operations there is no opportunity to follow in detail the rest cure for the lack of time. We first produce passivity, then comes *faith*. With a basis of passive or restful thoughts and the concurrence of faith or confidence in the dentist he (the dentist) now is able to suggest by word of mouth, or through the subjective mind, his control of the sensations of the body.

If there is any condition that requires care it is at this period, for many cases of neurasthenia drag out for years and the patient eventually dies of some intercurrent disease. As shock is often one of the causes of this disorder all subsequent operations are under restraint and should be in many cases only temporizing. It is advisable to prepare the patient for an operation by suggesting a previous period of rest—a good night's rest by the use of a sedative or stimulant is frequently desirable. Strychnia, bromid of potas-

sium, antipyrin, morphin (used rarely), are some of the most reliable remedies. Hot water as a drink before and after operations is one of the most valuable remedies, and its value may be enhanced by the use of some of the milk foods of which we have familiar knowledge. Good food has double value in neurasthenia.

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GUAIACOL. By Chas. P. Holland, D.D.S. Guaiacol is one of the constituents of creosote. It is a colorless liquid with an aromatic odor; soluble in alcohol and slightly so in water. I have used it for two years and find it one of the best sedatives I have ever employed. In any case of pulpitis it will stop the pain in from one to three minutes. A young man came to my office suffering intense pain from an inferior first bicuspid. He wanted me to extract the tooth, but I told him I could save it. I applied the dam, excavated the cavity, and applied guaiacol on spunk to the exposed pulp. The result was magical; in one minute the pain had diminished and in three minutes had entirely ceased. I allowed the spunk to remain in the cavity, flowed thin cement over it, and dismissed the patient with instructions to return in twenty-four hours. At his next visit I applied arsenic to devitalize.

I use guaiacol in connection with arsenic and cocain for devitalizing, adding enough guaiacol to make a paste, applying on cotton or spunk to the exposure; then flow thin cement over the dressing. I have made about one hundred and fifty applications, and without complaint from my patients as to the teeth aching after same. I use guaiacol in capping pulps when from some accident the pulp has been exposed. I first apply the dam, wipe out the cavity with a solution of bichlorid of mercury about 1 to 200, and dry the cavity. I then make a concavo-convex cap of gold just large enough to cover the exposure; take some cement powder and add enough guaiacol to make a paste, fill the gold cap with paste, and apply over the exposure, carefully removing the excess paste from the edge of cap. I then flow thin cement in the cavity and allow this to remain for six months, when, if the tooth has not given trouble, I cut out part of the cement and add gold or amalgam as the case demands. I have capped a great many pulps and have had good success.

In children's teeth guaiacol is an ideal remedy when the little ones come suffering with the toothache and you do not like to risk

the use of arsenic. I take a little cement powder and add enough guaiacol to make a paste, apply over exposure, and then flow over this thin cement. I have treated a great many deciduous teeth in this way, and have never heard the youngsters complain about the tooth causing pain.—*Brief, Aug., 1901.*

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SEALING-WAX. By John Girdwood, D.D.S., Edinburgh, Scotland. Read before the American Dental Society of Europe, 1901. While the materials used for taking partial impressions in crown and bridgework—plaster and modeling-compound—are of proved value, they lack certain properties invaluable for this purpose. For instance, in the taking of an impression and bite in plaster, particularly when the bite is close, the plaster frequently fractures so badly that it is next to impossible to piece it together. Impression compound, on the other hand, cannot be made sufficiently hard and unyielding not to bend or drag during its removal from the mouth, and accordingly it fails to give a correct impression of the parts. A material, therefore, which will combine the good qualities of both, and in addition have special advantages of its own, will, I trust, prove as welcome to members of our profession as it has to myself. Such a material we have in sealing-wax, but I do not refer to the *ordinary* article of commerce, which is entirely unsuited to our needs.

It is now many years since I began to use sealing-wax for taking impressions and impression and bite together in crown and bridgework, and having procured some of a very high grade, with it I obtained better results than either plaster or modeling-compound. This led me to inquire of the makers whether something even better than what I had been using could be had, and I found that they made fourteen qualities of this article. Here it may be well to explain in what details the better qualities differ from the poorer, as this has a direct bearing on the suitability of sealing-wax to our work. The highest grade is composed of pure lac and vermilion, while successively low qualities contain a lessening quantity of lac, which on the downward scale of quality is gradually replaced by American rosin, till in the poorer qualities rosin, combined with cheap coloring matter, is exclusively used. It is the substance lac which is so indispensable to us as dentists, and without which sealing-wax would be as useless as tallow. It is an animal product

best known in the form of shell-lac, and is a colored resinous substance found in India, Burmah and the East. It is produced by a small insect, one-eighteenth to one-thirty-sixth of an inch in length, which lives in many kinds of trees, but the best lac is collected from two or three species of fig. As soon as the insects are hatched they fix themselves by their proboscides to suitable twigs and begin to form cocoons or lac cells. The females are far more numerous than the males, and secrete a greater quantity of lac, which surrounds all parts of the insect except the mouth, two apertures for air, and the anal opening.

The appearance of the lac incrustation varies. It sometimes takes the form of a thick, irregular, bark-like layer attached to the branches; at other times the appearance of rounded prominences, coalesced, surrounding or scattered over the branches. The lac when removed from the twig is placed in tubs of water, and beaten by pestles. It is now in the state of "seed lac." After drying, it is melted in cotton bags before charcoal fires, and by twisting the bags forced through the pores of the cloth and thus strained. Lac has many uses in the arts. It is used for making varnish, French polish, etc., and for fine sealing-wax, for which latter purpose it far surpasses all other materials, such as rosin, by its greater strength, plasticity, smoothness of surface and hardness when cold. American rosin, the base of the cheapest varieties of sealing-wax, is a vegetable product, and while it melts readily, under *great* heat it becomes so suddenly hard as to be unworkable and absolutely impossible for our requirements.

A trial of the improved wax at once showed me I had obtained a suitable material for my purpose, but wishing to see if it could be still further perfected, I stated my requirements to the manufacturers, stipulating for a material which would soften readily, remain plastic till nearly cold, and retain that condition long enough to enable me to take any impression, or impression and bite combined. In addition to the lac or vermilion some other agent was added to give more softness. An alteration in the proportion of the ingredients enabled them to furnish me with a material which I have found all that could be wished. It will thus be seen that between the friability of plaster and the unmanageable plasticity of modeling-compound, sealing-wax has ample scope to prove its superiority.

Uses of Sealing-Wax: (A) For taking impressions in crown and bridgework. (B) For taking impression and bite at the same time. (C) For holding loose teeth steady while grinding or scaling them. (D) For supporting loose or tender teeth when filling. (E) For supporting teeth which are affected by pericementitis, and which have to be opened up. (F) For steadying separators and clamps. (G) For filling in the hollow surfaces of crowns in polishing to prevent possible bending of caps or pins by the mechanical assistant. (H) For making up special trays in prosthetic work. (I) For stopping the bite at a given height in prosthetic work. (J) For filling root-canals in alcoholic solution.

In referring to the use of the material for taking impressions in partial cases I have already indicated the advantages it possesses over plaster and modeling-compound, its increased hardness and rigidity over the latter, and its decreased brittleness compared with the former. The body of this material is tougher and more unyielding, while its surface plasticity is greater than that of modeling-compound; consequently in impression-taking the gums are better forced away from the necks of the teeth and roots by this than by any other impression material, leaving the sharpest outline of the root end—a great boon to those who make their crown bands from plastic models.

(A) For taking partial impressions in crown and bridgework. Select a suitable tray and manipulate as with modeling-compound; see that the wax is not too hot, and chill the under side of tray for a moment with cold water; remove when sufficiently hard. If undercuts are very pronounced they may be built up with hard beeswax around the teeth, or with temporary gutta-percha. There is, however, always less drag with sealing-wax than with modeling-compound.

(B) In taking an impression and bite in one operation, say for a single crown or bridge, when the caps and bands are in position on the roots, proceed as follows: Soften a mass of sealing-wax of sufficient size and mold it round the capped roots and adjoining teeth with the fingers; this done, make the patient close the jaws tightly and then mold the wax over the buccal and labial surfaces of the adjoining teeth so as to secure a good impression of them, and remove when sufficiently hard. Hardening may be hastened by spraying with cold water.

(C) For steadying loose teeth which have to be ground, sealing-wax will be found better adapted than modeling-compound because of the properties above described. When, for instance, one or more loose lower incisors have to be ground down, mold a piece of the wax over the lingual surfaces of the six lower teeth to form a splint, chill it and hold in place with the thumb of the left hand, and with the index finger of the same hand steady the teeth on their labial surface, and grind from without inward or across.

(D) For supporting loose or tender teeth when scaling or filling, especially with gold. Such a splint, distributing as it does the strain over a number of teeth, reduces the shock to the loose teeth to a minimum.

(E) Again in that troublesome class of cases where a tooth is the seat of acute pericementitis and when the indications point to an immediate opening into the pulp-chamber as the only chance of affording early relief, such a splint as I have indicated enables one to perform this operation with the smallest amount of pain. Without such an aid many cases are so unbearably tender as to preclude the possibility of handling them until the acute symptoms have subsided.

(F) For steadying separators and clamps sealing-wax is of great assistance.

(G) For filling in the hollow surfaces of crowns, etc., in polishing, to obviate possible bending of caps or pins by the mechanical assistant. To those of our number who have known and suffered from this *deus ex machina*—the dental mechanic—this use of sealing-wax requires no insistence from me. Frictional heat in polishing will of course soften it, but not so soon as either gutta-percha or modeling-compound, which are most often employed here.

(H) For making up special impression trays in prosthetic work. When one or more teeth are left standing in either jaw it is often impossible to get a tray that will nearly fit the case, and not infrequently it is found necessary to make a special tray. This means an extra visit of the patient and loss of valuable time to the busy operator. The well-known plan of making up an impression tray with modeling-compound to fill up the space between standing teeth so as to enable plaster or wax to be carried to place answers fairly well in most cases, but when modeling-compound is employed the

results are seldom satisfactory, as the "cut-offs" or pieces of compound which are fixed to the tray become softened by the added material. Even when plaster is used the compound "cut-offs" are often softened by the natural heat of the mouth as well as by the warmth evolved by the plaster in setting, and as they bend on withdrawal of the tray from the mouth, a correct adaptation of the broken pieces of plaster to place in the tray is nearly impossible; in addition, the surface of these "cut-offs" lacks that smoothness which is one of the chief advantages sealing-wax possesses over other impression materials. For this purpose it is advisable but not necessary to use the finest kind of sealing-wax as is used for taking impressions. The following type of cases will serve to show my meaning: If the palate be high and the cuspid and molar teeth alone remaining, a special tray may be quickly and accurately made up. Select a tray that will embrace all the parts, soften a piece of sealing-wax of sufficient size, heat the tray to make the wax adhere, attach the mass to the palatal surface, and mold it to that surface while still plastic. Then press to place in the mouth and proceed in the same way with pieces to nearly fill the interdental spaces. If a plaster impression is required, a more accurate trimming of the sealing-wax "cut-offs" is wanted than when modeling-compound is used; the surface may be roughened to help retention of the plaster, or left smooth if it is deemed advisable to withdraw the tray first and afterward to remove the plaster impression in pieces. If a compound or other impression, heat the surface to facilitate adhesion. Unlike modeling-compound, sealing-wax is best softened by dry heat. A sufficient mass should be softened over the Bunsen burner or spirit-lamp and placed in a suitable tray. After an impression is cast and the model has had time to harden, the impression and model should be placed in boiling water for a few minutes to soften the sealing-wax, which is removed in the same way as ordinary modeling-compound.

(I) For stopping the bite at a given height in prosthetic work. Here again sealing-wax is unsurpassed, especially when few teeth remain and the whole force of the bite is directed on these. Small pieces of boxwood, so often used, are not easily adaptable, and take a considerable time and much trying in before they can be adjusted to the correct height; and, moreover, they do not take the impression of the opposing teeth, which is such a certain guide in subse-

quent "trying in" to the correct bite when once obtained. Modeling-compound or beeswax are not resistant enough to withstand repeated trials in the mouth, but yield and allow the bite to sink. Sealing-wax blocks, on the other hand, can be stopped at the right height, and when chilled will not yield further.

(J) Alcoholic solution for filling root-canals. While I cannot claim to have had long experience of this material for filling canals; yet what I have had encourages me in the belief that this solution in many cases possesses advantages over many others now in vogue. It is manipulated in the same way as chloro-percha, but is far more manageable, because alcohol does not evaporate so quickly as chloroform. Instead of inserting a cone of sealing-wax after the canal is filled with the solution it has been my habit to use a tapered piece of wire to fill the canal. I use a thickish alcoholic solution of *white* sealing-wax for this purpose.—*Review, Aug., 1901.*

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MALIGNANT GROWTHS IN THE MOUTH, INCIDENTAL TO GENERAL PRACTICE. By George A. Maxfield, D.D.S., Holyoke, Mass. Read before the N. Y. Institute of Stomatology, March 5, 1901. At a meeting in April, 1899, Dr. Dawbarn presented a case of sarcoma of the antrum and said, "If the dentist who first had the case had recognized the disease and had referred the patient to the proper surgeon, the extensive operation then necessary might have been prevented." I make a brief report of a few cases that have come under my observation, thus helping to emphasize the necessity of the dentist's ability to recognize malignant growths when first seen, so that the patient may be referred to a competent surgeon in the early stages of the disease. Although these cases occurring in the mouth and adjacent parts are not common, they are generally of such rapid growth that the time lost by ignorance on the part of the dentist in the early stages of the disease has rendered the life of the patient beyond recovery. Three cases of carcinoma have come into my hands during the past seven years.

CASE I. Mr. C., farmer, aged seventy, face badly swollen with fistula on under side of jaw directly under the left second molar which had been discharging for several weeks, came in by advice of his physician to have some teeth extracted, as it had the appearance of an alveolar abscess. On examination I found the teeth badly

affected with pyorrhea alveolaris and very loose. I extracted two molars and two bicuspids, and a careful examination failed to reveal any connection with the fistula through any of the sockets of the extracted teeth. A probe was then passed into the fistula for over two inches. The patient was referred back to the physician, who sent him to the hospital, where it was pronounced carcinoma. An operation was not thought advisable on account of his advanced age, and he died there some five weeks later.

CASE II. Mr. W., aged seventy-one, came in the first week of December, 1896, to have a tooth extracted. Examination revealed all the teeth badly affected with pyorrhea alveolaris, the left inferior second molar quite loose and giving considerable pain, the first molar and both bicuspids missing, and nothing to indicate any other trouble. The second molar was extracted. The second week in January he came in again to have the left inferior cuspid extracted, as this was giving pain. I found it quite loose, and also noticed a small growth—cauliflower like—in the socket of the molar I had previously extracted. I extracted the cuspid and directed him to call two days later, when I could give him more time. He did not keep the appointment. Two weeks later, on meeting his niece, I informed her of the serious aspects of the case and the necessity of immediate attention. The day following he came in. I then found the growth in the molar socket had increased in size, projecting above the gum, also a small growth in the socket of the cuspid, the gum near the molar having become ulcerated on the upper surface. The growths bled very easily, and had been staining the pillow every night, and had been giving much pain. I injected the growths with ninety-five per cent carbolic acid and removed them, and after thoroughly washing the parts with a weak solution of the acid I applied a dressing of carbolic acid one part and glycerin two parts on a pledget of cotton, and ordered fifteen drops of the same in a glass of water to be used freely as a mouth-wash. I also prescribed Fellows' hypophosphites. I saw him every two days for a week, when I simply washed the parts with hydrogen dioxid and followed with the same dressing as the first time. The improvement was then so marked that I directed him to continue the treatment at home and to call again in one week.

I next saw him February 18, when I noticed the growth returning in the molar socket. I removed it this time by injecting tincture

such as nitrate of silver or any other caustic. Stop smoking. Use only soothing mouth washes. None but radical operations should be performed for its cure; and whether to operate will depend upon the differing conditions in each case.

Cancer of the tongue. *Diagnosis.*—To be distinguished chiefly from syphilis of the tongue. There are quite a number of distinguishing features, viz., cancer of the tongue (epithelioma) is almost the only type of malignant growth of the tongue. It begins usually from a decayed tooth as an irritant factor. Although not the actual cause of cancer, mechanical irritation is generally the predisposing cause. This is again shown in cancer of the scrotum as found in chimney-sweeps. Indications of syphilis are more frequently on the dorsum of the tongue; cancer, as stated, begins at the point of tooth irritation. Cancer generally presents a single ulcer, while syphilis is often seen in more than one place on the tongue. Cancer is the more painful of the two; it occurs in patients a great deal older, over forty years as a rule, while syphilis occurs more frequently under that age. Cancer is oftener found in the male, syphilis more frequently in the female. The discharge is more offensive in cancer. In cancer it is only the neighboring lymphatic glands beneath the lower jaw that are involved, while in syphilis the enlarged lymph-nodes are more diffused, occurring elsewhere in the body quite as much as near at hand. But after all the diagnosis upon which we are chiefly to rely is what is revealed to us by the microscope. In the case of a cancer, upon removing a small piece you will find nests of epithelial cells surrounded by a stroma. In the case of syphilis we find small round-celled infiltration. Indeed, syphilis has been called a "disease of the degraded leucocyte."

Another ulcer occasionally seen here is that of tubercular diseases. Although this may somewhat resemble the others, it is excessively rare for it to occur as a primary condition, and generally there is evidence of very advanced tuberculosis elsewhere. The microscope will reveal the tubercle bacilli, etc., in a section removed for examination. We can also have ulcers due to simple uncleanliness, of course, the microbes of the mouth, of which there are some twenty varieties in the human saliva, setting up an irritation in certain cases. Some of these microbes are pretty virulent. The microscope will also help us here. So much for differential diagnosis.

Treatment.—In carcinoma of the tongue I hardly need say that

there is only one treatment, which is prompt and radical surgery. Every week I see cases in my hospital and elsewhere that have gone too far for hopeful results. Perhaps one reason for this is, that on account of the surgeon suggesting the removal of the whole tongue, the patient delays the operation until it is too late. Inasmuch as these growths generally occur at the extreme lateral margin of the tongue, the operation for the removal of one-half the tongue will be just as effective, in most instances, as the more radical operation of the removal of the entire tongue, and with half a tongue the patient can speak fairly well. In so far as blood-supply and lymphatics are concerned we have practically two tongues. It is easily shown, by injecting one of the lingual arteries of a cadaver with blue solution, that exactly one-half of the tongue will be blue and the other will remain red, there being no anastomosis between the two halves except sometimes at the very tip.

There are a number of interesting points in connection with excision of the tongue or part of it. Ordinarily three or four mistakes are made. I think the Whitehead operation should never be done. This is made entirely within the mouth. It is akin to performing an operation for cancer of the breast without cleaning out the armpit glands. The lymph-nodes (glands) beneath the jaw should always be removed, because they will frequently develop cancer later on, being really infected, though not to be felt at first. For this reason the tongue should be removed from beneath the jaw, as then the glands can at the same incision be attacked. In this incision there is the great advantage, too, that we can easily expose and tie the lingual artery before cutting the tongue, and thus the operation is rendered almost a bloodless one. If it is possible to do so, without approaching the cancer, I think it wise to save the last two or three centimetres of the tongue, instead of removing it entirely down to the hyoid bone; this to aid the epiglottis in its work. We should save the twelfth nerve, which is entirely a motor nerve, and which can readily be attached to the raw surface of the stump of the tongue, thus innervating it. This will enable the epiglottis the better to be brought down on the top of the larynx in swallowing. I think this is a new point and a good one; it is one I have employed. It is extremely important, where the tongue is removed far enough back to affect swallowing, that for a long time the patient be kept in an inverted position—that is, with the head a little lower than

the chest—so that the rank and fetid saliva and discharges shall not gravitate into the larynx and so on towards the lungs. The patient after this operation is especially threatened with a septic pneumonia from this cause. He can be kept for weeks in this position if need be, and should not be allowed to sit up until the parts are well granulating and the saliva is quite odorless again, or, better, until he has learned to close the epiglottis.

In those cases of cancer of the tongue which have gone beyond the reach of radical cure there are still certain things that may be done. I do not know of anything in surgery quite so near magic in its dramatic results as the outcome of the division of the lingual nerve (the so-called gustatory nerve), where there is intense suffering in cancer of the tongue and where it has gone beyond the aid of the knife. The pain sometimes is so great as to bring tears to the patient's eyes at every act of deglutition or speech. The lingual nerve, which is the one causing the suffering, can be divided in five seconds' time under cocain, by introducing into the mouth a curved bistoury two centimetres below and behind the grinding surface of the last molar and cutting against the ramus of the jaw towards that tooth. There is nothing else of any importance that can be injured here, and the instant the section is made the patient cannot feel any pain in this half of the tongue, in front of the circumvallate papillæ. Of course the nerve will grow together again in a short time, but it can be as easily divided again.

Bony Malignant Growth.—Of these the ones most frequently seen by dentists are those of epulis springing from the socket of a tooth. They may or may not be sarcomatous. In any case one should not hesitate long. Many tumors of the mouth and elsewhere, although benign in their incipiency, will frequently develop malignant characteristics in time. If a fungous growth that has been curetted away returns, no attempt should be made to retard it by means of pressure, as by a gutta-percha plug, as has been done, nor should leucoplakia be treated with irritants. It is a case for a surgeon, and the treatment should be either nothing or absolutely radical. It is best not only to curet away the growth, but a considerable portion of the alveolus in that region should be removed by the gouge. Early diagnosis of bony malignant growths about the jaw and elsewhere has brought out one point in my experience which I have repeatedly alluded to before in this connection. Every

one knows that not infrequently both sarcoma and carcinoma decalcify bone, and that fact can be used in early diagnosis. I remember a case in which a dentist extracted one of the bicuspids in the upper jaw for a severe faceache. He noticed with casual interest that the tip of the root, which should have been of stony hardness, was soft. That ought to have been to him a striking evidence of malignant growth. However, he did not think of it, and subsequently the case came to Dr. Howe. He suspected a malignant condition and sent the case to me. I have here a specimen which some of you have seen and which indicates the condition. (Upper jaw removed from this patient was here shown with sarcoma filling the antrum.) I made the diagnosis by taking an ordinary needle, and found that I could pass it into the bony roof of the mouth with about the same resistance as in ordinary cartilage. In many instances this will help you. If you can run the needle into the bone, or even engage the point in bony tissue which should be dense, a malignant growth should be suspected.

Prognosis.—I starved the region by cutting out the external carotid on both sides, and this brings up a very interesting question of treatment. When one is able to excise a cancer and cut well beyond its limits, it is of course the wise thing to do. When this is impossible, unless the antitoxin treatment succeeds (and the usefulness of the latter seems limited to one type of sarcoma alone) the patient is going to die within a few months with absolute certainty. There is nothing more hopeless than cancer of the mouth or jaws which has gotten beyond the possibility of excision. There is but one hope left in these otherwise hopeless cases, and that is the starving of the growth by cutting off the blood supply. By that I do not mean simply *tying* both of the external carotids, but cutting them out from end to end, tying off and dividing all the branches in the process. Ligating the internal or the common carotid would cut off the blood-supply from the brain. It is simply desired to cut off the blood-supply from the superficial parts.

It seems proved that the normal tissues can get along with very little blood as compared with that required by a malignant growth, and when the blood-supply is cut off from this growth, although it does not disappear, it shrinks and in most instances does not resume its growth. In sarcoma I have been particularly successful, less so in carcinoma. I have seen many cases, otherwise utterly hopeless,

which by this method have had many months of life. Although I would not assure a cure, I could at least promise this. The method consists in cutting off the blood-supply from the external carotids on both sides. As I have said, it consists in not merely tying these arteries, for if only that were done the pulse would return inside of a week so that it could be felt in the temporals and facials. There are thirty or forty ways in which by anastomosis this might happen. It first occurred to me six years ago, and I then tried it at once, that a more radical way might be carried out by cutting out the entire length of both the external carotid arteries. This sounds like a pretty dangerous operation, but it is not excessively difficult and can be done in half an hour. I never attempt to do it on both sides at one operation, however. The only case I know of where this was attempted resulted in the death of the patient from shock. I prefer to do it in two operations at intervals of two weeks. I have now done this operation in over forty instances. In several cases, after the operation on the affected side first, there was so much shrinkage of the growth that the patient, mistakenly thinking himself cured, refused to have it done on the other side. Now I always do it on the sound side first, and then the patient, finding there is no change, will consent to having it done on the other side. The operation has also been done by others with a very low rate of mortality. In every one of these instances the patient was cachectic, and from that fact one would expect a greater mortality. I should be willing to assert that in experienced hands the operation would not result in over five per cent of deaths. The amount of blood lost need not exceed an ounce. You may ask how these parts can now get any blood supply at all. There are two at least, one from the internal carotid, which by its infraorbital branch anastomoses with the angular from the facial; the other through the occipital branch of the external carotid; the princeps cervicis branch of this artery anastomosing with the profunda cervicis coming from the first intercostal artery. It is perfectly feasible to cut off still further the blood-supply by tying the infraorbital and occipital if desired. It has been suggested by Dr. Wyeth, in order to still further cut off the blood-supply from the smaller branches, that the internal maxillary artery, for example, be injected with boiling water. Another suggestion of Dr. Wyeth is the injection of sterilized paraffin or some combination of wax

which at the temperature of the body would again become solid. It is a question whether this would not seriously threaten sloughing of the part; and of course we should not try such means until after experimenting upon the lower animals. We are justified, however, in taking radical measures when we remember that these are hopeless cases, directed straight to the other world in a very short time unless the disease is checked by some means; and that medicines and even ordinary surgical intervention are wholly useless in the more advanced cases.—*International, June, 1901.*

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DENTISTRY AND DARWINISM. By Eben M. Flagg, D.D.S., Philadelphia. Read before the Central Dental Association of Northern New Jersey, May, 1901. While at the International Dental Congress in Chicago in 1893 your essayist was much impressed by a paper read by the late Dr. Bonwill, to show that the evolution doctrine of Charles Darwin was a delusion and a snare and could be so proven by a proper study of the human denture. Dr. Bonwill spoke as follows: "Kindly give me your undivided and unprejudiced attention, and when you have gone to your homes and studied the whole subject as it deserves, you will find it worthy of some consideration as a truly scientific way of getting at an ultimatum by which evolution shall be decided to be as much of a fallacy as it has been an hypothesis." As it is now eight years since I "went home and studied the subject," and as I have not yet decided that evolution is a "fallacy," I present a few considerations which still incline me to believe that the great doctrine which Darwin announced as the result of lifelong labor, receives very substantial support from the study of our specialty, and had philosophical men who were trained dentists taken part in the agitation which his doctrine produced, it would have been an easier matter to weaken the prejudice of the public, a prejudice, I may add, which is not yet wholly conquered.

The doctrine of evolution teaches that organisms progress from simple to complex forms, and that every form is but the modification of some preceding one. It does not deny retrogression, but claims that it is in obedience to the same law; that the higher form cannot exist except as it comes or is evolved from the lower; that out of nothing comes nothing, much less a universe. That those changes and modifications are so gradual that the utmost subtlety

of science cannot detect the dividing line between the plant and the animal, between the animal and man. That no matter how refined and superior an organism may be, as illustrated in the case of man, there still exists ample testimony of the lower origin, showing clearly from whence the higher came. That this testimony is not entirely obliterated even where circumstances have produced a type that has endured for countless generations, and that even the highest type may be subject to atavisms or "throwbacks."

To the average observer no proposition could seem more absurd than that the refined Caucasian man and woman had any relationship whatever with the animal. Should we doubt it, we would be treated to an enumeration of the great contrasts that could so easily be observed, and when the list had become very long the case would be considered as proven. Any one who ventured to claim the facts of relationship must be proven not by contrasts but by comparisons, and that the differences noticed in different types might be merely differences of degree, would be considered as one opposing his puny voice against an overwhelming mass of evidence. And such was the case when Darwin announced his doctrine of evolution to the world. The mass of ridicule and sneers heaped upon him and his theories would have vanquished any one who was not sustained by the knowledge that he had labored for the welfare of his fellow man. He asserted positively that from the man to the child, from the child to the infant, and from the infant to the embyro, every step was in the direction of the animal.

Let us see if dentistry has anything to offer in demonstration of this assertion. What are the characteristics of a front tooth of the highest animal with which we are acquainted, our intelligent dog or monkey, for example? 1st—It is opaque, or nearly so. 2d—It has one uniform color from neck to cutting edge. 3d—Among the various individuals of the species there is very little variety in that coloring. 4th—The surface of the animal's incisor is entirely devoid of the graceful undulatious and curves that give so much beauty to the human tooth. There is so little of modeling in the tooth of the animal that it would be difficult to tell which was the first, second or third incisor, and except from attrition, decide which was the upper or lower; which was the right or left.

Let us now consider the characteristics of the adult human incisor. 1st—It is translucent, sometimes almost transparent. 2d—Its color

varies in marked degree from neck to cutting edge. 3d—In different individuals the variety of color is so great that at least fifteen or twenty different shades can be distinguished by the expert dentist. 4th—The surface of the human incisor abounds in graceful undulations and curved lines, and all the teeth of the human adult have such a delicacy and perfection of modeling that in a healthy mouth each tooth is possessed of great individuality.

Now let us examine the adult human cuspid. There are certain points which distinguish it from that of the animal. The corresponding tooth in the latter is more worthy of the name cuspid, for it is a mere point. It can puncture and seize. The adult human cuspid is something more than a mere point. It has a point and two cutting edges like a spear. It resembles the animal's in that it is longer, more powerful and has a more massive root than any other tooth in the denture, but these qualities are not necessary to the well-being of the human species. Man as man does not require them for offensive or defensive purposes. These conditions which exist even in the most advanced of the human race do not even add to the physical nourishment of the individual. Level the human cuspid to the dimensions of its neighbors, and so far as his physical well-being is concerned he would hardly feel the loss. Such is not the case, with any animal. Destroy the distinctive characteristics of the cuspid tooth in one and you immediately reduce his ability to cope with his fellows, seize his prey or defend his family.

And, again, this adult cuspid tooth in human beings possesses another quality. Its color is different from that of any other tooth in the head, and in the distribution of that color the same rule does not apply to it that applies to any other tooth. All four of them are more yellow than any of the other teeth, and the yellow is continuous throughout the entire length of the crown. It does not shade and vary as is the case with other human teeth. In other words, in this respect it is like the cuspid of the animal. Where is the necessity for this? "Evolution" explains it by saying that it is a remnant of animal life that man has inherited, but where is the argument drawn from "Design" that can explain it? So important is this feature of the human cuspid to the beauty and expression of the denture, that the denture does not look natural without it, and a set of artificial teeth never can be made to have a natural expression when this feature is omitted. Even the beauty of the incisors is enhanced by the

contrast, yet it is no more necessary to man that this should be so than it is for him to be provided with muscles to flap his ears, of which muscles he still has remnants.

Having now noticed how very little is distinctly animal in the adult human denture, I will invite your attention to the temporary denture of the child. Here the proofs of animal origin increase and multiply as might be expected, and though Darwin did not mention it, his doctrine implied it. 1st—There is less variety of color and more of uniformity and monotony in the distribution of that color, and such is the case with the animal denture. 2d—There is less translucency and transparency. This is also the case with the denture of the animal. 3d—In different individuals there is not the variety of coloring, as is the case with the permanent denture, and in this respect it also resembles the animal denture. 4th—With the exception of the second temporary molar there is not the same variety of modeling that we see in the permanent denture. Another kind of resemblance to the animal. 5th—The temporary cuspid is not so spear-shaped as is the case with the permanent cuspid, but is rounder; also, it slants slightly backward in many cases and interlocks with its antagonist like the cuspid of the animal. 6th—Its color is the same as that of the other teeth, as is the case with the denture of the animal. 7th—The first temporary molar has not the characteristics of any other tooth in the head, temporary or permanent, but bears strongly the appearance of the premolar of the animal. Its crown closes in from the gum margin, narrowing down to the triturating surface, and the enamel of the forward exterior cusp describes a sharp, bulging incline like unto those animals whose teeth are adapted to the crushing of bones, which is certainly not a necessary function of the child's denture and cannot have its origin in "Design."

Let us now come to the subject of atavisms or throwbacks, and dental ones are not wanting. Atavisms may indicate progression or retrogression. When we observe the glimmering of a superior quality, mental, moral or physical, suddenly making its appearance in an inferior man or animal, it is reasonable to infer that such a being has fallen, unless we can show that such a superior quality has been acquired through the immediate effort of the one possessing it, and such atavisms have more than a philosophical value. They have often a moral value as indicating what it is desirable to cultivate in order to rise. So, when we observe the sudden appearance in a superior being of a certain quality utterly incongruous with the general type of such an individual, in fact, so utterly incongruous that we can only associate it with an organism so vastly inferior as to belong to another species, then "Evolution" teaches us that this being has not fallen but has risen; that

the observed phenomenon is an atavism or throwback, and this atavism, it seems to me, has also a moral significance as indicating to what a height humanity may rise, judging from what it has already risen.

Now, if we are not elevated animals, but are degenerated angels; if there has been a "fall of man," rather than a rise of man, it would be pleasant to see some physical atavisms indicating man's angelic origin. If some of us would sprout a pair of wings, for instance, it would give us perhaps important information about aerial locomotion, which we are so painfully struggling to accomplish, and when we wished to have intercourse with our fellow men of other nations we would be able to avoid the custom-house, which is also an atavism from the Mediterranean pirates, and which coils itself around our civilization so persistently as does the tailbone between our legs.

What sort of things angelic teeth may be, or might have been, we can only surmise. Most of us, no doubt, are quite satisfied with the kind that may be found within the lips of many of our young ladies, but when we come to dental atavism there is nothing in them of the angelic, at least in anything that I have ever seen. To begin with, we will consider the supernumerary tooth, which I think we will have to admit is an evidence of atavism. Now as there are forty-four teeth in the higher mammalia as against thirty-two in man, it follows that man would require twelve supernumerary teeth in order to be numerically even with his remote ancestor, dentally speaking, and we never see that number in any mouth, but those that we do see all bear the marks strongly defined of reversion to the animal type which I shall not revert to now, closing my paper with the consideration of an atavism that is remarkably well illustrated and pertains to the cuspid tooth. The model which I pass around is not that of a chimpanzee, gorilla or cannibal, but of a refined young lady, the daughter of a Cabinet Minister. She is not a ferocious shrew, but a lady of remarkably gentle manners, yet if one were to read her temperament from the cuspids alone it might be thought that it indicated quite as much of the tiger as of the human. Not only have the superior cuspids no trace whatever of the human, but they have also the same occlusion and diastema that belong to the animal. The lower cuspids on the lingual surface have a very slight resemblance at one point to the human cuspid. The writer has known the family of this lady for fifteen years, and she is the only one whose mouth shows this pecuilarity. There is also no evidence of prenatal influence as a factor in its production, and we can regard it only as another link in the grand chain forged by Darwin; a chain which cost him a lifetime of arduous toil to forge, and then extorted from him the declaration that "man is descended from an animal who has pointed ears, is covered with hair, and furnished with a tail."—*Items, Aug., 1901.*

Letters.

ILLINOIS STATE DENTAL SOCIETIES.

MONMOUTH, ILL., Aug. 30, 1901.

To the Editor of the Digest,

MR. EDITOR:—In his annual address before the Northern Illinois Dental Society last year the president stated that of the five district dental societies originally organized in the state it was "the only one still doing business." We beg to take issue with the gentleman, as the First District, formerly the Central and the Western Illinois, has held its meetings annually since its organization in 1882, and the meeting for 1901 will be held at Monmouth Oct. 1–2. Visiting dentists are always welcome at our sessions.

Yours truly, R. W. HOOD, Ex. Com.

ILLINOIS STATE SOCIETY CLAIMS ANOTHER VETERAN.

LOS ANGELES, CAL., Aug. 31, 1901.

To the Editor of the Digest,

MR. EDITOR: While president of the Illinois State Dental Society in 1894 I tried in my address to give the war record of every member of the society, living or dead, who had seen service, but I have just learned that I failed to capture them all. Dr. J. D. Moody, who had removed to California, seemed too young to have been a soldier during the Civil War, but he was nevertheless present during our late unpleasantness, as the following record shows, same being written by him at my request.

"Joseph Donahey Moody enlisted in Company H, 42d Ohio Volunteer Infantry, James A. Garfield commanding, November, 1861, and served three years and two months, being appointed sergeant of Company H. He was Garfield's clerk at headquarters so long as the latter commanded the regiment, and has a personal letter from the General written at Shiloh, in which he says, 'I am sorry that you are not still my clerk.' Dr. Moody was on detached service in the Brigade Quartermaster's Department for nearly a year, then being appointed Second lieutenant and assigned to Company I, Ohio Volunteer Infantry. He was placed in charge of the ambulance corps of the Ninth Division, General Osterhaus com-

manding, at the beginning of the Vicksburg campaign. He served unofficially until the spring of 1864, when he returned to the regiment and was appointed first lieutenant, and later adjutant of same. His service was in eastern Kentucky, along the Mississippi river, White river (Ark.), Vicksburg, Red river and Louisiana."

The members of the Illinois Society can clip this item and insert it in the transactions of 1894, thus making the record of our army members complete so far as I know.

Fraternally yours, GARRETT NEWKIRK.

CHRONIC MAXILLARY EMPYEMA.—Winslow reviews the opinions of authorities, reports cases of antral empyema, and emphasizes the following points: 1. That antral empyema is not only not always, but is not generally due to dental disease, the contrary view being based upon clinical rather than anatomical observation. 2. Its frequency and the necessity for systematic examination by multiple proof puncture in suspected cases; latent empyema would thus not be allowed to exist until it makes itself manifest by caries, and the apparent causal relation between the two would become much less notable. 3. Unless evidently of dental origin, antral empyema should be treated through the nose until it is certain that complications exist, and we then should investigate through a large opening in the facial wall. 4. The alveolar opening should be reserved for those cases of undoubted dental origin, and for those who refuse the radical operation. Even then the cases should not be referred entirely to the dentist, for they usually take no account of nasal conditions.—*Jour. A. M. A.*

MERCURIAL ANGINA. By Dr. A. I. Liantz.—Very little has been written concerning mercurial affections of the throat. The author reports the histories of four cases in which there were well-marked affections of the pharynx and tonsils as the result of mercurialism. This affection generally occupies a limited area upon the tonsils and arches of the palate, occasionally penetrating into the lacunæ or extending to the uvula. As a rule, the disease is unilateral, but both sides are sometimes affected. In most cases the gums, cheeks and tongue remain free from mercurial symptoms. There is pain on swallowing, which is sometimes very acute and spreads to the ear. The submaxillary glands are swollen and painful. Occasionally the case begins acutely with diffuse redness of the palate and pharynx, fever, vertigo, headache, nausea, etc. Objectively, the disease is characterized by erosions or flat ulcers, covered by grayish-white deposits and surrounded by red and swollen mucous membrane. The ulcers tend to spread laterally and but rarely become deep or leave scars. These lesions may appear at the beginning of a course of treatment with mercury, or even after the drug has been discontinued. The treatment consists in the use of hydrogen peroxid and, in the severer cases, in the application of iodoform emulsion, silver nitrate, or chromic acid solutions.—*Klinitch. Jour.*

The Dental Digest.

PUBLISHED THE FIFTEENTH DAY OF EVERY MONTH
At 2231 Prairie Avenue, Chicago,
Where All Communications Should be Addressed.

Editorial.

ILLINOIS STATE DENTAL BOARD AFFAIRS.

In our last issue we stated that the task of investigating the bogus diploma mills and questionable methods of state boards was assigned to the Dental Protective Association by the National organizations while in session at Milwaukee in August. Accordingly we secured the services of counsel and began the work of running down the various rumors and collecting evidence, so as to ascertain who were the guilty parties and to bring them to justice. We now give to our readers the following brief summary of what has been accomplished up to the time of going to press.

The first step was to lay the matter of the abuses existing in the State of Illinois before the proper authorities—the attorney general, and the State's attorney at Chicago, through which channel the investigation of the shortcomings of the Illinois State Board of Dental Examiners is being carried on. The next step was to secure reliable evidence of the misdemeanors which it was claimed had been committed.

We have already acknowledged the aid given us by the American Consul at Munich, Germany, Hon. Jas. H. Worman, who was early in the investigation and who labored diligently collecting evidence against the bogus diploma traffic in Germany. This matter has been published in a general way in most of the dental journals, under the head of "Report of the Foreign Relations' Committee of the National Association of Dental Faculties." We will on this account omit what must be already familiar to our readers and discuss more recent occurrences relating to the subject in hand.

The prosecution having been begun in the courts of Chicago in the Gumpoldt matter, upon information furnished by Consul Worman, and upon the advice of Hon. Charles S. Deneen, State's Attorney, a warrant was issued against J. H. Smyser, late secretary of the Illinois State Board of Dental Examiners, on the charge of forgery in

issuing a license purporting to have been dated May 5, 1899, to one Emil Gumpoldt. Smyser was arrested and gave bail, but the prosecution was subsequently discontinued, because expert evidence tended to show that the license did not contain Smyser's handwriting, and also because the original license was in Germany and so was not immediately available for the case in hand.

The second complaint against Smyser was for uttering the Emil Gumpoldt license, upon which he was also arrested and gave bail. This proceeding was also discontinued owing to the absence of the original license.

The third charge was for the forgery of the authenticated proceedings of the Illinois State Board of Dental Examiners, whereby it is claimed that Smyser on May 20, 1898, unlawfully issued to one Chas. A. Finley a license to practice dentistry in the State of Illinois. On this charge Smyser was arrested and gave bail, and a hearing was had before the Hon. Marcus A. Kavanaugh, Judge of the Superior Court of Cook County, Illinois, sitting as a committing magistrate. On this hearing it appeared that C. A. Finley, to whom Smyser had issued the license May 20, 1898, had presented himself, along with a class of fifty-seven others, before the Board at a meeting held on March 21, 1896, for examination to procure a license to practice dentistry in the state; that of the fifty-eight applicants only eleven passed a successful examination, and that Finley was one of those who failed to pass and hence was not entitled to a license. It further appeared in evidence on said hearing that Finley had no diploma and was not a graduate of any reputable dental college. It also appeared in evidence that on or about May 17, 1898, more than two years after he had been examined by the State Board, he (Finley) presented an affidavit to Smyser in which he recited that he was 30 years old, a native of Indiana, a resident of Chicago, and that he had been a practitioner of dentistry ten years and had completed a two years full course of lectures and instruction in the N. W. C. The date of the license shows that after this affidavit was made by Finley and presented to Smyser, a license was issued to Finley. The reader will observe that Finley then obtained a license without a diploma and without any examination by the State Board other than that on March 21, 1896, in which he failed.

On March 21, 1896, at the time when Finley was examined and failed, Dr. L. L. Davis was secretary of the State Board of Dental

Examiners, and the authentic minutes of that meeting were copied in the record book of the Board and testified to by Davis in court to be in his own handwriting. It was shown on the hearing that the record was kept by Davis, and we will quote therefrom: "The following named persons presented themselves for examination, the result being that the eleven first named obtained a permanent license to practice dentistry in Illinois."

Among those that failed C. A. Finley's was the nineteenth name. This name we detected had been changed from "C. A. Finley" to "C. A. Teteley." It was also discovered that the name of C. A. Finley had been written at the head of the list of successful candidates, and that the right-hand figure of the number 11 in the caption of the Board's proceedings, showing how many had passed a successful examination, had been changed from 1 to 2, making the result appear to be that 12 candidates had been successful instead of 11. It was also seen that the list of successful candidates had been further designated by numbers placed on the left-hand marginal side of their respective names, running from 1 to 12, and that figure 1 had been placed at the left of C. A. Finley's name, further indicating that he was at the head of the list.

Profs. Tolman and Drake gave expert testimony that in their opinion the name "C. A. Finley," as it appeared in the minutes written by Dr. Davis as the nineteenth unsuccessful candidate for license, had been changed to "C. A. Teteley," and that such change had been made by Dr. J. H. Smyser. That the name C. A. Finley, as written at the head of the list of successful candidates, was in the handwriting of J. H. Smyser. That the right-hand figure 1 in the number 11 had been changed to a 2, that it had been made by J. H. Smyser, and that the numbering of the successful candidates was the work of J. H. Smyser. Dr. Smyser took the stand in his own defense, and denied making the change of "C. A. Finley" to "C. A. Teteley." He did not fully or clearly deny changing the 11 to 12, and before leaving the stand, on cross-examination by Assistant States Attorney Barnes, frankly admitted that he had written the name "C. A. Finley" at the head of the successful candidates. He offered no satisfactory explanation and we know of none to offer for him.

During Smyser's examination on this charge the State called C. A. Finley, who had made his affidavit that he had practiced den-

tistry for ten years prior to May 17, 1898. His attention being called to the affidavit, he testified in substance that he was in doubt whether the affidavit stated the facts intended when made. He was not clear in his own mind whether the affidavit as originally made stated that he had practiced for ten years or seven years; he thought it was seven years and that the affidavit must have been changed, but the handwriting experts were of the opinion that the affidavit was in Finley's handwriting and that any changes present had been made by him. Finley further admitted in his testimony that a considerable portion of this time, whatever the number of years, was devoted to study and acquiring a knowledge of dentistry and hence he could in no wise say of himself that he had been a dental practitioner for ten years prior to the date of his affidavit.

It was on this charge that Judge Kavanaugh, in holding Smyser on Sept. 9, 1901, to bail to await the action of the Grand Jury, said: "Since the adjournment on Saturday I have given this case careful consideration. The first charge against him (Smyser) in regard to the alteration of a record is, it seems to me, without defense—without serious defense. It appears unquestioned that the minutes of the Board were altered. It is hardly denied that Dr. Smyser made the alterations, so far as the names are concerned, and the testimony points conclusively to the fact that the man who made the alteration in regard to the name of Dr. Finley, and who wrote the numbers on the front of the book, must have been the man who made the alterations in the other letters and the other name.

"Now, the excuse given is not one that appeals to the judgment of anyone who has studied the circumstances. Here is a man who has presented himself to the State Board for examination and has failed. He remained content with that situation of affairs for almost two years. At the end of two years, the theory of the defense is, and the theory of Finley himself is, that he presented himself to Dr. Smyser and that Dr. Smyser without consultation with any other member of the Board nor notice to them of what had been done, altered the face of the record upon the mere word of Dr. Davis, and here is a man licensed to practice dental surgery in this state where the record shows he is not entitled to do so. Now, there is a ring of probability is some portions of the recital of the defendant here, dependent not so much upon the evidence as

upon that indefinable thing which comes to men who have spent many years in weighing evidence—the probability that some one else also is concerned in this. That some one else probably did introduce Mr. Finley to Dr. Smyser, and Dr. Davis upon the stand would not deny that it was probable that he himself had written that figure "2" upon the book, but even though somebody else were concerned in it, it is no excuse for this defendant. The alteration of that record is a forgery in view of the statute."

This charge in the Finley matter is awaiting the action of the Grand Jury of Cook County now in session.

The next offense for which complaint had been made against Smyser, and upon which he was arrested and held to bail, and upon which charge a hearing was had before Judge Kavanaugh, at the same time as in the Finley matter, was that of bribery. In this the arrest was made on the complaint of Oscar Cornelius Igney, a young man who alleged the purchase of a license from Smyser for the consideration of $400. It was testified by Igney in court upon the preliminary hearing to determine whether the crime of bribery had been committed or not, and whether or not there was probable proof of Smyser's guilt for which he should be held to await the action of the Grand Jury, that he (Igney) was a student in the Illinois School of Dentistry and had done considerable work and was employed in the laboratory of a dentist in this city named Haycock. That being desirous of obtaining admission to the dental profession at the earliest time possible he consulted Haycock prior to October last as to the advisability of his taking the state board examination, and was advised by Haycock that the easiest way to obtain a license was to purchase it, which could be done for a small sum of money, and Igney further testified that at Haycock's suggestion he placed in his hands $150.

A short time prior to the state board examination, which was held in October, 1900, Haycock returned to him a portion of the money, advising him that he would secure a license from the board. Igney took the examination but failed. He testified further that subsequently Haycock gave him a note and sent him to Smyser, which led to opening direct negotiations and the purchase by Igney and sale by Smyser of an Illinois State license to Igney. According to Igney's testimony, at Smyser's suggestion the scene of these negotiations was transferred from Smyser's office to a secluded corner in

the Boston Oyster House in this city, where it is testified by Igney he paid Smyser $200 in cash on account of the license which was to be issued to him, and that he had also paid Smyser other sums of money. That being in Smyser's office one day, and anxious to obtain the coveted document which would obtain for him a professional title, Smyser introduced him to a third party, one Edward Flynn, with the suggestion that Flynn would give him his license. Igney further testified, that in compliance with an appointment made by Flynn he met him at the Morrison Hotel in this city shortly afterwards, where Flynn (so Igney testifies) demanded more money, saying that there were five members of the State Board of Dental Examiners and that each of them would require $100. Igney states that he made the best deal he could, and gave up some more money and a diamond pin, the value of which latter he estimated at about $125.

The license given Igney was No. 3030, was dated Dec. 28, 1900, and bore the names of H. W. Pitner, A. C. Barr, W. C. Jocelyn, president, and J. H. Smyser, secretary.

The body of the blank form was admitted by Igney to have been filled out by him under Flynn's personal direction, and it recites that he had received the degree of D.D.S. from the American College of Dental Surgery of the State of Illinois. April 4, 1895, when as a matter of fact Igney had never received any such degree, had never been within the doors of that college, and had never even seen the college building.

Smyser upon the witness stand denied all knowledge and complicity in this transaction. Judge Kavanaugh, however, held him to bail to await the action of the Grand Jury.

Judge Kavanaugh in deciding the case among other things states: "Unless he (Igney) had corroboration in the testimony, I should hesitate very much to hold any one upon his testimony alone. The law requires that one sitting as an examining magistrate should be convinced that a crime has been committed, and second, that there is a reasonable ground that the person charged is guilty of the crime, but it appears without question that a crime was committed, it appears without question that Igney did get in his possession a certificate to practice to which he was not entitled. He got it from persons for whom there was no motive that could be reasonably ascribed except the motive which he gives of

corruptness. Now, it may be assumed without question that he did obtain by means of bribery a certificate to practice dental surgery in this state and that one was issued to him. Therefore, I must find that a crime was committed."

On the 24th of August a further complaint was made by the chairman of the Dental Protective Association for the arrest of Flynn on a charge connected with the issuing of the Igney license. On this warrant, although Flynn has resided in this city for years, the state's officers have not been able to compass his arrest up to the time of our going to press.

Briefly told this is the sum of the work that has thus far been accomplished. What will be done in the future cannot be fully estimated at this time, nor would it be wise to disclose our plans. The line of action in the matter of bogus diplomas and diploma mills is still in abeyance. In the October DIGEST we shall give in detail the testimony of the handwriting experts, showing the methods of detecting forgery, and how they arrived at their decision in this case, which will make very interesting reading. We can also promise our readers some startling disclosures next month.

Notices.

SOUTHERN CALIFORNIA DENTAL ASSOCIATION.

The fourth annual meeting of the Southern California Dental Association will be held at Los Angeles, Cal., Oct. 8–9, 1901. The profession are cordially invited to be present. L. E. FORD, Secy.

NORTHERN ILLINOIS DENTAL SOCIETY.

The fourteenth annual meeting of the Northern Illinois Dental Society will be held at Joliet, Oct. 16–17, 1901. The profession in this and neighboring states are cordially invited to be present. J. J. REED, Secy.

MARYLAND STATE BOARD OF DENTAL EXAMINERS.

This board will hold examinations for certificates to practice dentistry on Nov. 1-2, 1901, beginning at 9 a. m, at the Maryland University Dental Department, at the corner Green and Lombard Sts., Baltimore. Application blanks and all information will be furnished by the undersigned.

F. F. DREW, Secy., 701 N. Howard St., Baltimore.

NORTHEASTERN DENTAL ASSOCIATION.

The seventh annual meeting of this organization will be held at Springfield, Mass., Oct. 30—Nov. 1, 1901. The committee promises eight original

essayists of more than local reputation, and forty clinics, table and chair. "Memorial Building," where the sessions are to be held, has three floors, upper for meetings, middle for exhibitors, and lower for clinics. One and one-third rate on the railroads by the certificate plan. Springfield is a well located railroad center, and has eight first-class hotels. All ethical dentists are cordially invited to be present.

EDGAR O. KINSMAN, Secy., Cambridge, Mass.

PHILADELPHIA DENTAL COLLEGE ALUMNI ASSOCIATION OF NEW ENGLAND.

The second annual meeting of this association will be held some time during the session of the Northeastern Association at Springfield, Mass., Oct. 30 to Nov. 1, 1901. It is desired that the alumni practicing in the New England States who are not members of the Alumni Association will communicate with the secretary and attend the meeting.

D. W. JOHNSTON, Secy., 139 Orange St., New Haven, Conn.

HARVARD DENTAL ALUMNI ASSOCIATION.

The thirtieth annual banquet of this Association was held in Boston June 24, 1901, with 123 persons present. Gen. Curtis Guild, Jr., editor of the *Boston Commercial Bulletin*, was the guest of the evening and spoke upon the "duties of a liberal education." The following officers were elected for the ensuing year: Pres., H. W. Gillett, Newport, R. I.; V.-P., L. D. Shepard, Boston.; Secy., W. E. Boardman, Boston; Treas., H. S. Parsons, Boston; Ex. Com., W. E. Boardman, Boston, Wm. P. Cooke, Boston, C. E. Perkins, Brockton, Mass.

W. E. BOARDMAN, Secy.

ILLINOIS STATE BOARD OF DENTAL EXAMINERS.

At the reorganization of the Illinois State Board of Dental Examiners at Springfield, Aug. 23, 1901, the following officers were elected: Pres., T. W. Pritchett, Whitehall; Secy., J. G. Reid, Chicago. The other members of the board are Don M. Gallie, Chicago; G. H. Damron, Arcola; C. R. Rowley, Chicago.

The next regular meeting of the board to examine applicants for license to practice dentistry in this state will be held at Chicago October 17-19, 1901, in the rooms of the Northwestern University Dental School, Madison and Franklin Sts. Candidates must come with the necessary instruments, rubber-dam and gold, to perform practical operations and such other work as is deemed advisable by the board. Those desiring to take examination should matriculate with the secretary ten days before the meeting. The fee is $10.

J. G. REID, Secy., 1006 Champlain Bldg., Chicago.

SIXTH, SEVENTH AND EIGHTH DISTRICT DENTAL SOCIETIES STATE OF NEW YORK.

The thirty-third union meeting of the above societies will be held in the assembly room of the Osburn House, Rochester, N. Y., Oct. 29-31, 1901. *Preliminary Announcement.* I. Will Nitrous Oxid and Oxygen Supplant

Ether and Chloroform in General Surgery and Nitrous Oxid alone in Dental Surgery? Dr. W. J. Roe, Philadelphia. II. The Enamel of the Central Incisors. Dr. Sylvester Moyer, Gault, Ontario, Canada. III. Some Embarrassing Educational Problems. Dr. W. C. Barrett, Buffalo. IV. Amalgam, the Place it Has Won in Dentistry. Dr. F. A. Balachey, Buffalo. V. The Gingival Border from a Scientific Standpoint. Dr. S. B. Palmer, Syracuse. VI. The Ethical Relation of Dentist to Patient. Dr. A. C. McAlpine, Warren, Pa. VII. Some New Lights on the Etiology of Pyorrhea Alveolaris. Dr. J. B. Ernsmere, Buffalo. VIII. Subject to be announced. Dr. R. H. Hofheinz, Rochester. IX. Surface Markings upon the Teeth. Dr. J. J. Madden, Buffalo. X. Subject to be announced. Dr. J. N. Crouse, Chicago, Ill. XI. Cocain in Pulp Extirpation. Dr. B. S. Hert, Rochester. XII. Diagnosis and Treatment of Malocclusion. Illustrated with models and appliances. Dr. H. A. Pullen, Buffalo. XIII. Utilization of Artificial Light. Mr. E. L. Elliott, Newark, O. XIV. Subject to be announced. Mr. W. A. Purrington, New York. The committee have under arrangement other important additions. There will be a great many clinics, together with a complete dental exhibit. The committee are making strenuous efforts to make this one of the best union meetings ever held by the societies and well worthy of your attendance. Members of the profession are cordially invited.

F. MESSERSCHMITT, Chairman, 138 Main St. E., Rochester, N. Y.

News Summary.

TEETH are like verbs—regular, irregular and defective.

C. E. ESTERLY, a dentist at Lawrence, Kan., died Sept. 10, 1901.

DR. G. SMITH, 71 years old, a dentist at Richmond, Va., died Aug. 11, 1901.

C. S. MYERS, 29 years old, a dentist at Lancaster, Pa., died Aug. 24, 1901.

J. C. BOOTHE, a dentist at Clayton, Ill., died suddenly of heart disease, Aug. 14, 1901.

JAMES A. GARLAND, 45 years old, a dentist at Chicago, died Sept. 9, 1901, from asphyxiation.

W. M. POTTER, formerly a dentist at Menasha, Wis., died at the Waupaca Soldiers' Home last month.

WM. PORTER, 45 years old, a dentist at Jamestown, N. Y., died suddenly from apoplexy, Aug. 6, 1901.

H. M. SEYBOLD, 30 years old, a dentist at Ipswich and Aberdeen, S. D., died from typhoid fever, Aug. 22, 1901.

M. B. CLEVELAND, 66 years old, a cousin of the Ex-President, and a dentist at Jacksonville, Fla., died Aug. 7, 1901.

MARRIED.—E. P. Frazier, Washington, D. C., Aug. 7; H. M. Messenger, Chicago, Aug. 14; H. C. Rodenhauser, Bloomington, Ill., Aug. 15; Henry Shelp, Freeport, Ill., Aug. 15.

FIRST AND LAST TEETH.—A small boy recently, being questioned about teeth, replied that the first ones that came were milk teeth and the last ones false teeth.

PEROXID OF SODIUM.—This rather common bleaching agent, according to Walter Smith, sets glycerin on fire, and if added to a solution of formaldehyd produces a violent explosion.

MUSIC AND TEETH.—Artemus Ward was the first person to connect music with teeth, as he said that he knew a man in Salt Lake City "who did not have a tooth in his head, yet could beat the bass drum as good as anybody on earth."

PROFESSIONAL MEN IN TROUBLE.—The last week in August the dentists, physicians and lawyers of Bristol, Va., were fined $12.50 each for practicing their respective professions without a license. Some fifteen men are affected and the case will be appealed by them.

EXPLICIT.—The Dental Protective Supply Co. recently received an order for a set of teeth, and among other things the dentist said—"The above set is for a *hitoned* lady whoes teeth were vary small, & tolerable Short, She is quite fair and rudy, in a word—a pritty woman! & "painfully" Choise!"

HAIR AND TEETH BOTH.—Generally women past 75 years of age cut only a new set of teeth, but one in Yankton, S. D., recently cut a third set, and grew a new crop of hair, which was jet black, although her own had been snow white for many years. At least, this is what the newspapers tell us.

BANKRUPT.—E. M. Johnson, dentist, St. Cloud, Minn. H. R. Johnson, dentist, Milwaukee, Wis., liabilities $8,521.44; assets about $1,200. His case is a good example of the fact that newspaper advertising for dentists does not pay, as his liabilities are almost without exception money due for newspaper ads.

ROOSEVELT STIRS DENTISTS.—The daughter of President Roosevelt recently had an abscess on her jaw, and he took her to a hospital for treatment. According to newspaper report, the dentists are incensed at his action, because the case properly came under their dominion and not that of physicians or general surgeons.

FREE DENTISTRY.—Dentistry is supplied without expense to patients at Blockley (the county almshouse), Philadelphia. In the current year's appropriations to the Bureau of Charities there is an item of $2500 for dentistry and dental supplies. The staff consists of Drs. I. N. Broomell, M. H. Cryer, R. H. Norris and T. C. Stellwagen, Jr.

ALUMINUM BRONZE WIRE IN SURGERY.—R. Pichler ascribes to this material greater usefulness and adaptability for surgical purposes than has silver. By actual experiment it was found that it possessed greater inhibiting powers on the growth of bacteria than the latter metal, and it seems especially adapted for use in situations where infection of the suture wounds is to be feared, as in the perineum, inguinal region, and the mouth, as well as where the sutured tissues are under great tension, and the stitches are to remain in place for a considerable length of time.—*Centr. fur Chi.*

FLUID FLUX THAT DOES NOT PIT.—This consists of a saturated solution of equal parts of boracic acid and borax. It is prepared as follows: Mix equal parts of boracic acid and powdered borax and place them in sufficient water to get a saturated solution. This may be determined by a slight residue on the bottom of the receptacle.—Dr. Dodel, *Ohio Journal.*

RETORT COURTEOUS.—His head was thickly covered with a mass of very red hair. Near him sat a man with a shining bald pate. The former playfully observed, "I suppose you weren't about when they dealt out hair?" "Oh yes I was," replied the bald-headed gentleman, "but they offered me a lot of red hair and I told them to throw it into the dust-bin."

DENTIST SAVES LIFE.—A practitioner in England recently saw a crowd gathered around a woman who was apparently in an epileptic fit. He quickly observed that several of her teeth were missing, and on opening her mouth found that an upper denture was lodged in her throat, choking her. With some difficulty he removed the plate, and the woman soon recovered.

TO HOLD INLAYS WHILE CUTTING THE GROOVE.—In cutting the groove around an inlay before cementing it in the cavity much difficulty is experienced in holding the very small inlays. This can be overcome by sticking the inlay to the end of a piece of orange-wood with shellac, which holds it firmly and permits the operator to cut the groove readily.—C. F. Allen, *Review.*

MOST AWKWARD POSITION.—The Queen of Greece has asked various crowned heads and royalties to answer the question, "What do you consider the most awkward position in which one can be placed?" The Duke of Cornwall and York writes: "The most awkward position in the world is when you are sitting in the dentist's chair; the most annoying position when the dentist tells you, 'It won't hurt!'"

"ORAL SURGERY."—By Stewart Le Roy McCurdy, M. D., Pittsburg. This work, as its full title indicates, is a text-book on general medicine and surgery as applied to dentistry. It is practically a course of lectures covering the entire field of oral surgery, and while primarily designed as a text-book for students, will be found useful by the practitioner. Cloth $3, net. Calumet Publishing Co., Pittsburg.

PLUCKY DENTIST.—C. W. Corel, a dentist at Kansas City, was injured while returning from El Reno, Okla., where he was fortunate enough to draw a claim during the recent allotment of land by the government. His injuries were serious and resulted in partial paralysis, but as it was necessary for him to file his claim in person he returned to Oklahoma, most of the way on a stretcher, filed the claim and was then taken to a hospital.

VOICE RECOVERED THROUGH EXTRACTION.—About a year ago a farmer's wife near Bath, N. Y., suddenly lost her voice and has since not been able to speak at all. Recently she went to a dentist to have some teeth extracted, and the first one hurt her so much that she jumped out of the chair and called the dentist a "mean man." When she realized that her voice had returned she had the other teeth taken out

QUAINT CUSTOM.—In some parts of Norway may be found in cottages, as well as in houses belonging to rich peasants, wooden chairs with teeth plugged in the seats. For generations it was a custom (now abandoned) to plug teeth of the first dentition into the seats of chairs. There are several rows of teeth in some chairs. The custom comes from the days of Paganism, the idea being to exorcise the demon of toothache.

WIFE SUES SALOON-KEEPERS.—The wife of a prominent dentist at Nebraska City, Neb., has filed in the district court a rather sensational petition, in which she asks for $10,000 damages from four of the largest saloon-keepers of the city, for selling her husband liquor during the past three years. She asserts that owing to their action he is a mental, physical and financial wreck. The bondsmen of the saloon-keepers are named as defendants.

CARL FISCHER, 35 years old, a dentist at Zanesville, O., died Aug. 9, 1901. In the June DIGEST we announced that he had been adjudged insane. His *friends*, thinking to play a practical joke on him, induced him to run for mayor, although they knew he had not the ghost of a show. He was hopelessly defeated, and the jibes of the same "friends" drove him insane, and his death soon followed. The fool-killer ought to take a trip through that part of Ohio.

"POEMS OF THE FARM AND OTHER POEMS."—By Charles Nelson Johnson, Chicago. The author, whose works on dental subjects are widely known, has surprised all but his most intimate friends by following in the footsteps of Eugene Field and J. Whitcomb Riley. His child poems will appeal even more strongly to the majority of readers than his descriptions of rural life. This little volume is worthy of better treatment by both printer and binder. Daniels Company Press, Chicago. Cloth, $1.00; paper 50 cents.

"ETIDORPHA."—By Dr. John Uri Lloyd, Cincinnati. Although published some time before "Stringtown on the Pike," its author is but now reaping the reward to which this work entitled him. "The End of the Earth" is a scientific allegory. It is the strangest mixing of science, mythology, theosophy and morals the reader will anywhere find. The chapters on the drunkard are said by critics to equal any word picture in the English language. Price, cloth, $1.50. Dodd, Mead & Co., Publishers, New York.

JACKSCREW.—Having a case recently when a long jackscrew would be an advantage, I found that some one had screwed an old jack into the end of a disk mandrel, and that I had one already in my case without the necessity of cutting a new thread. Having found, therefore, that the thread of the various jackscrews and mandrels are the same, I send this wrinkle, hoping that others will find it as useful as I did. The head should be filed or ground square, and the mandrel cut the proper length of the case, and the "long jack" is ready for business.—W. H. Mitchell, *Cosmos*.

CLEFT PALATE, RUBBER NIPPLE FOR USE WITH.—The difficulty experienced in feeding by means of a spoon children with cleft palate in the hospitals led to personal device of a nipple which would obviate this. The modification in the nipple consists in the attachment of a "wing" of sheet

rubber which fills the cleft during the act of sucking. With the ordinary rubber nipple this device does not work well, because of the collapse of the nipple. By putting the attachment on the "non-collapsible nipple" the desired object is accomplished.—S. Lloyd (*Pediatrics.*)

NEW TREATMENT FOR FOOT-AND-MOUTH DISEASE is reported to have been successfully introduced in France by a Paris medical man. The treatment is said to consist of cauterization by chromic acid in a concentrated solution of 33 per cent. It is claimed that mouth-sores are often cured by a single application, the animal beginning to feed almost immediately, while the sores of the feet require three or four applications. The French Minister of Agriculture is reported to have proposed the creation of a special service of studies and experiments to combat this class of ailments, asking special credits to provide for its organization and maintenance.

SOAPSTONE.—Pulverized soapstone has several uses in the dental office. Have a quantity of the powder in a wide-mouthed bottle on the operating-case; a little rubbed on the dam where the holes are punched will make the application easy. The powder applied to the surface of cement fillings prevents its sticking to the instruments. In the laboratory a pepper-box from which to sprinkle the powder onto plaster of paris, after the plaster in the lower part of the flask has hardened sufficiently to handle, makes a good separating medium. The powder sprinkled into the shoes, if a little tight, makes them feel a size larger.—John G. Harper, *Review.*

TURPENTINE-ETHER NARCOSIS.—E. Becker. The familiar properties of the volatile ethereal oils in inhibiting mucous secretion are utilized by Becker to diminish the secretions during ether narcosis. He finds that oleum pini pumilionis is the best adapted for the purpose. It closely resembles oil of turpentine but has an agreeable aromatic odor which masks that of the ether. He adds twenty drops—about 1 gm.—to 200 gm. of ether. It dissolves readily and he administers the mixture the same as the ether alone. He has been much gratified with this improved method of narcosis in his experience with about 500 patients and considers it a distinct advance.—*Centralblatt f. Chirurgie.*

WEIGHTING A FULL LOWER DENTURE.—When I once thought it necessary to increase the weight of a lower set of vulcanite I simply packed inside the rubber small strips of lead or tin. I have long since ceased to realize any special benefit from extra weight. For many years I advocated the use of cast-metal plates. A few years since I was obliged to resort to a full denture. For my second plate, as the jaw was very flat and narrow, I used a cast-metal plate. To my surprise it would not answer at all. There was no ridge to prevent its sliding forward or sidewise. If I leaned forward to speak to a student the plate slid forward. Upon lying down in bed it would slide sidewise.—L. P. Haskell, *Brief.*

BACTERICIDAL ACTION OF THE SATURATED SOLUTION OF SODIUM CHLORID.—Francesco Testi concludes that this solution has a bactericidal action on various pathogenic germs, this action being favored by a high and constant temperature. The resistant power of bacteria to sodium chlorid may be thus

classified in a descending scale: Cholera bacillus, Finkler's bacillus, typhoid bacillus, diphtheria bacillus, glanders bacillus, and the pyogenes aureus. This applies when the temperature is above 36 deg. C. The germ of contagious anthrax offers a weak resistance to sodium chlorid, losing its vitality after one day's exposure to its action. The bacillus subtilis, on the other hand, offers a prolonged resistance. The skin of carbuncle does not lose its virulence even after twenty days' action of sodium chlorid.—*La Reforma Medica.*

NOMA WITH EXTENSIVE THRUSH INFECTION IN ADVANCED AGE.—Zusch describes this case, which was that of a man aged sixty-six years, suffering from senile dementia with increasing cachexia. The first sign of trouble was a moderate swelling of the cheek, soon followed by the beginning of the thrush formation. A necrotic area developed in the center of the fungous patch, and in spite of active antiseptic treatment the breaking down advanced rapidly, perforated the cheek, and caused the whole side of the mouth to slough away. At the autopsy very advanced arteriosclerosis was found with multiple aneurisms, while the muguet growth was seen to have invaded pharynx, esophagus, epiglottis, larnyx and trachea.—*Muncheneer Med. Wochensch.*

INFANTILE SCURVY.—Dr. J. L. Morse describes some cases of this disease in a recent number of the *Boston Med. and Surg. Jour.* As he points out, it is caused by deprivation of fresh food—by feeding infants exclusively on artificial foods or sterilized milk. He describes the gum symptoms as follows: Swelling, sponginess and ulceration of the gums are very common symptoms, but are almost always preceded for some time by pains and often by swelling of the extremities. The gums are purple and often hemorrhagic. The picture is that of stomatitis ulcerosa. It was formerly supposed that the gums were not involved unless there were teeth. In about one-half of the cases collected by the American Pediatric Society in which there were no teeth the gums were, however, involved. In some cases redness and swelling of the gums precede the other symptoms and sometimes are the only manifestation of the disease. The prompt relief of these symptoms when the diet is changed or when orange juice is administered is proof of their scorbutic nature.

CHRONIC OTORRHEA.—Frank Allport (*Jour. A. M. A.*) emphasizes the existence of the diversity of opinions concerning the treatment of chronic otorrhea, and he believes that much misunderstanding could be averted if conditions rather than a name were considered. A chronically discharging ear does not always indicate the same pathological conditions. A simple exudative mucous-membrane inflammation may exist, with imperfect drainage, which may be healed by an enlarged opening and simple treatment; or exuberant granulations may be present, which are removable and curable; or ossicular or mural caries may occur, relievable by acids, drainage, treatment, etc., or by an ossiculectomy and curettage; or the disease may have extended further into the antrum; or the mastoid antrum and cells may be involved and possibly the sinuses and intracranial contents, calling for prompt and

large operative procedures. It is best to examine each case independently as to its pathological condition, symptoms, duration and character of its discharge, etc., and advise a plan of action harmonious with such unprejudiced examinations and observations. The dividing pathological line seems to be the extension of the disease to the antrum.

EFFECT OF MASTICATION IN INFLUENCING GASTRIC SECRETION.—Max Schreuer and Alfred Riegel, in order to determine in how far the secretion of gastric juice was influenced by the mastication of the food, gave test-meals of various composition, and then examined the contents of the stomach after longer or shorter intervals of time had elapsed. The food was given in various ways—being chewed and swallowed as usual, or artificially subdivided and put into the stomach through a tube; or chewed and then expectorated without swallowing. The results showed that the act of mastication is capable of directly modifying the activity of the gastric glands, and that this is independent of the chemical stimulation produced by the saliva swallowed. When the material tested consisted of carbohydrates it was found that the exclusion of mastication was followed by a more or less considerable deficiency in the hydrochloric acid values, while when the meal consisted of proteids (meat, hard-boiled eggs) the normal or hyperacid stomach reacted differently from one in which subacidity was present. In consequence of the greater degree of stimulation produced by these substances, the normal or hyperacid stomach is able to compensate for the hydrochloric acid deficit attending the omission of the act of chewing, while the subacid stomach is not capable of this, but shows marked variation from the normal after the reception through a tube of artificially masticated food.—*Zeitschrift fur diatetische u. physikalische Therapie.*

DOCTOR MUST NOT LEAVE PATIENT.—Dr. P. H. Flood was ordered to pay $2,000 damages by the supreme court recently. Evidence showed that over a year ago he was called to attend Mrs. Margaret A. Lathrope. An operation was deemed necessary by him. Her screams interfered with his application of the necessary instruments. He finally said that if she "did not quit he would quit." And leave he did, although the patient was in agony. The husband followed the physician to the door, begging him not to go. He refused to come back, and it was over an hour before another doctor was obtained, the woman in the meantime suffering dreadfully. The other surgeon performed the operation, saving the mother's life at the expense of that of the child. Mr. and Mrs. Lathrope sued Dr. Flood and got a verdict for $2,000 in the superior court. Dr. Flood appealed the case to the supreme court, and yesterday the latter affirmed the lower court's action, saying, in part: "It is the undoubted law that a physician may elect whether or not he will give his services to a case, but having accepted his employment, and entered upon the discharge of his duties, he is bound to devote to the patient his best skill and attention, and to abandon the case only under one of two conditions. First, when the contract is terminated by the employer, which termination may be made immediately. Second, when it is terminated by the physician, which can be done only after due notice and an ample opportunity afforded

to secure the presence of other medical attendance. . . . He can never be justified in abandoning it (case) as did this defendant, and the circumstances show a negligence in its character amounting well-nigh to brutality." —*San Francisco Examiner.*

MEMBRANE OF STOMACH IN LIVING SUBJECT PHOTOGRAPHED.—Drs. Lange and Melzing have succeeded in taking photographs of the mucous membrane of the stomach in the living subject. A stomach-tube, sixty-six centimeters long, with a diameter of eleven millimeters, is introduced, having at the lower end an electric lamp and at the upper end a camera. The stomach is first emptied and washed and then distended with air. Then fifty pictures can be taken in rapid succession in from ten to fifteen minutes. By turning the apparatus on its axis all parts of the mucous membrane can be pictured. The photographs are about the size of a cherry-stone, but they can be enlarged to any extent.—*Phila. Med. Jour.*

MEDICINE IN THIBET.—Dr. Susie Carson Rijnhart says there is no medical art worthy to be called such in Thibet. She writes: "For headache large sticking-plasters are applied to the patient's head and forehead; for rheumatism often a needle is buried in the arm or shoulder; a tooth is extracted by tying a rope to it and jerking it out, sometimes bringing a part of the jaw at the same time; a sufferer with stomachache may be subjected to a good pounding, or to the application of a piece of wick soaked in burning butter grease, or, if medicine is to be taken internally, it will consist probably of a piece of paper on which a prayer is written, rolled up in the form of a pellet, and if this fails to produce the desired effect another pellet is administered composed of the bones of some pious priest."

A MODEST MAID.

An old maid lived in our town,
  So I have heard it said,
Who, if you called a dress a gown,
  Would blush like poppies red.
Her mind was neither frail nor weak—
  Her modesty was rare.
Of autumn trees she'd never speak
  Because their limbs were bare.
When night its sable shadows threw,
  She'd tumble in a swoon
If curtain did not hide from view
  The man up in the moon.
She never sang a sacred song—
  A very modest whim:
To think of one she thought was wrong
  Because it was a hymn.
A plumber caused her death one day—
  So the story goes—
By asking her in a careless way
  To let him see her hose.

—*Exchange.*

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